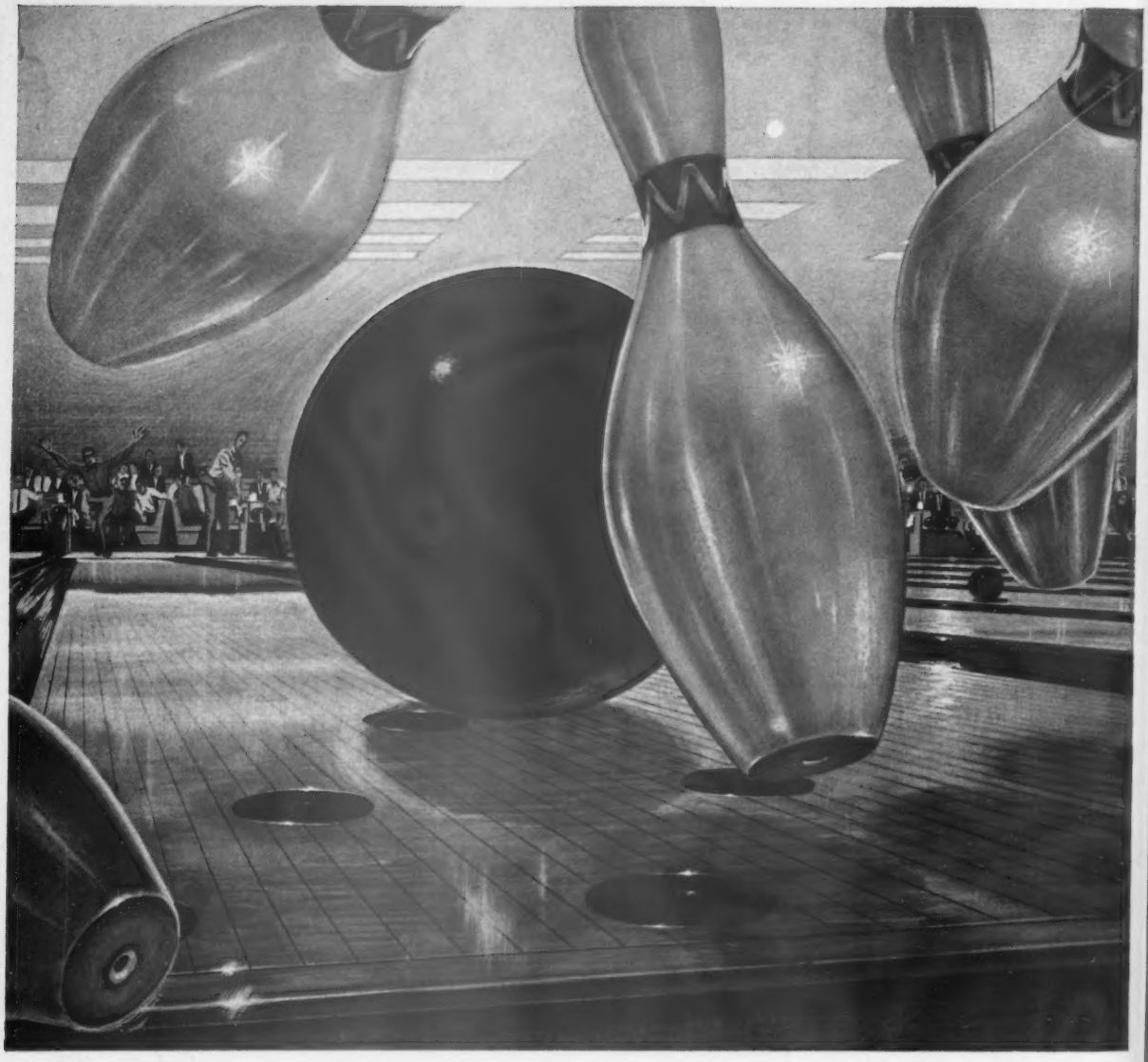
PAINT and VARNISH Production.

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

PTEMBER
1955
$5 per copy



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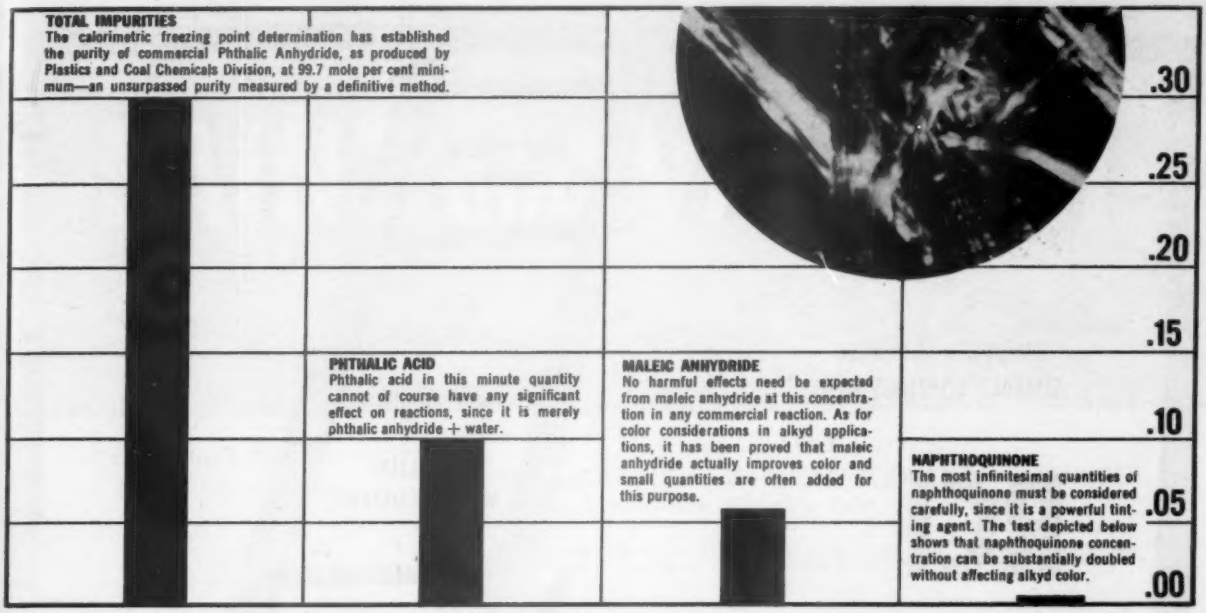
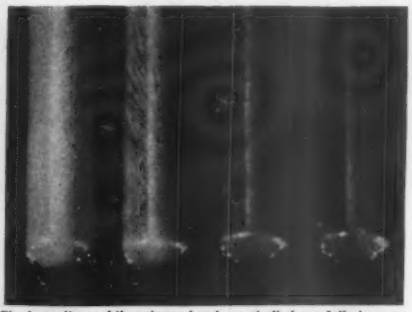


The vertical bars indicate the mole percentages of certain impurities in Phthalic Anhydride of Plastics and Coal Chemicals Division. Notes above each bar describe the tolerance of commercial reactions with respect to that impurity. Thus the chart defines the threshold of purity and shows that this Phthalic Anhydride surpasses it.

The Threshold of Purity in Phthalic Anhydride

Out of the laboratories of the Plastics and Coal Chemicals Division comes an important concept: the threshold of purity. Its application to Phthalic Anhydride holds vital significance for producers of alkyd resins.



The impurity naphthoquinone has been studied carefully because of its deleterious effect on phthalic color. In the table below and the corresponding molten color samples in the photo above, you see the progressive deterioration of color as naphthoquinone concentrations are increased.

Naphthoquinone Wt. % Based on Phthalic Anhydride	Alkyd Resin Color (Hellige)	Molten Color (Hazen)
0	6	10
0.001	6	25-50
0.01	10	100
0.1	12	300-350

When known concentration of naphthoquinone in our Phthalic Anhydride is substantially doubled (underlined figures), Alkyd Resin Color remains unchanged. Continuing tests of this kind have proved that our manufacturing controls keep naphthoquinone concentrations well below any harmful level.

A while ago we told you about the new standard of purity developed for phthalic anhydride by Plastics and Coal Chemicals Division. Now we want to show you how our research has carried purity investigations a step further—to consideration of individual impurities.

One by one, our laboratories have tracked down the impurities in commercial phthalic anhydride, seeking the limits at which these impurities have no effect on the manufacture of quality alkyd resins. This set of limits may be called the threshold of purity, defined for phthalic anhydride in the chart above. Alkyd manufacturers may look there for a precise definition of purity in phthalic anhydride—and for proof that our Phthalic Anhydride fulfills every part of it.

While our researchers have been busy defining the purity of phthalic anhydride, our manufacturing plants have been living up to the definition. Production samples from our four plants are closely checked for conformity in a central laboratory. Here our technical vigilantes pass judgment on the purity and uniformity of the collective phthalic output.

In developing this strict purity definition and abiding by it, Plastics and Coal Chemicals Division has taken the old-time menace out of trace contamination in phthalic anhydride. The threshold of purity concept opens a new age of confidence for the alkyd producer, giving him every assurance of ideal kettle performance that modern technology can muster.

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(Established in 1910 as The Paint and Varnish Record)

VOL. 48 SEPTEMBER, 1958 NO. 10

FEATURES

PRODUCTION

FOREIGN DEVELOPMENTS

DEPARTMENTS

NEXT ISSUE

Our October Special Convention Issue will feature a comprehensive article on the use of polyols in coating resins. This exclusive feature will consist of a series of prepared articles by experts in each field discussing glycerine, pentaerythritol, sorbitol, methy glucoside, trimethylolethane and trimethylolpropane, hexanetriol and various glycols

MEMBER BUSINESS BPA PUBLICATIONS AUDIT, INC.

EDITORIAL COMMENT

Plan to Attend

NEXT month the Federation of Paint and Varnish Production Clubs will hold its 36th annual meeting and 23rd Paint Industries' Show in Cleveland.

This year's program will set a new high in technological excellence. The Joseph J. Mattiello Memorial Lecture will be presented by Dr. Eugene G. Rochow, professor of inorganic chemistry at Harvard University. Dr. Rochow has contributed much toward the development of silicone polymers. While with the Gerneral Electric Company he worked on high-temperature insulating materials which led to the study of organosilicon materials in 1938. By 1940 he developed a new and simple synthesis of methyl chlorosilanes from silicon, which marked General Electric's venture into the silicone field. The title of Dr. Rochow's lecture will be "In Pursuit of an Idea".

The keynote address will be delivered by Dr. Lincoln R. Thiesmeyer, president of the Pulp and Paper Institute of Canada. During the final years of World War II, Dr. Thiesmeyer functioned as a Head of Technical Aide in the Office of Scientific Research and Development in Washington. Following the war, he organized and administered the Brookhaven National Laboratory on Long Island. From 1946-1950, he was executive assistant to the director of that atomic energy research center. The title of Dr. Thiesmeyer's address will, "Indians, Ingeniuty and Insurance".

Panel discussions dealing with pigment dispersion, new developments in epoxy and urethane coatings, new tools for solving paint problems, water-thinned paints for industrial use, and celluosic finishes will be featured at this year's meeting. In addition, several interesting Club and Room Award papers will be presented.

A detailed report on the Federation Paint Research Institute will round out the program. Dr. J. Scott Long, director of the Institute, will explain its aims and objectives and the progress already made toward enlisting the services of outstanding scientists to study fields heretofore unexplored and to set up landmarks for the future development of products.

According to the Federation, this year's Paint Show will be the biggest in its 23 year history. One hundred and forty-nine exhibit spaces, occupied by 92 exhibitors have been sold.

The Paint Industries' Show serves as a focal point where technical and production men can look for answers to their problems. There is no better opportunity available for one to review at one time, the most recent developments in raw materials and equipment.

In view of the competitive nature of the paint industry today, the interchange of ideas with key technical personnel of suppliers will help paint manufacturers to develop new markets for paint products as well as increase plant output and efficiency.

Your attendance at both the Federation meeting and Paint Industries' Show is a *must.*

Our New Look

AS you have noticed, this issue of PAINT & VARNISH PRODUCTION has undergone a change in format. Together with this this change we have added two new departments—Foreign Developments and Production.

This month our foreign department is featuring a survey on Soviet Paint Technology. Future issues will spotlight developments in other European countries, India and Japan.

A highlight of our new production department will be monthly features on topics of interest to the paint production man. The characteristics and duties of the production man are discussed in this issue under the title, "The Production Man—A Profile."

We are enthusiastic about these two new departments and sincerely hope you will dervie considerable benefit from them in your work.

Your opinions and comments are welcomed.

How Joe Naughton Makes ADM

"Easy to Buy from"

Control always has been southpaw Joe Naughton's specialty. Star hurler for the Jersey City Cardinals at 21, Joe had a corner-catching curve that even snagged an offer from the New York Giants. Instead of basking in big league limelight, however, he was soon sloshing through Korea with the army engineers. After that Joe joined ADM's quality control team . . . a position where his specialty—control—is every bit as vital as on the pitching mound.

Here Joe has found unlimited opportunity to build a future for himself and his pretty young wife. ADM stresses quality; maintains a large central control laboratory in Minneapolis and 30 plant control labs across the country where over 125 "guardian angels" of quality keep close tab on raw materials and finished products.

Typical of these control chemists, Joe takes his work seriously. Already a lab supervisor in the Newark, New Jersey plant, he also is earning his degree in chemistry at Seton Hall University three nights weekly. Except for sandlot baseball, Joe's pitching these days is for the many manufacturers who depend on ADM for consistently top quality resins and other products.

ADM

RESI NEWS

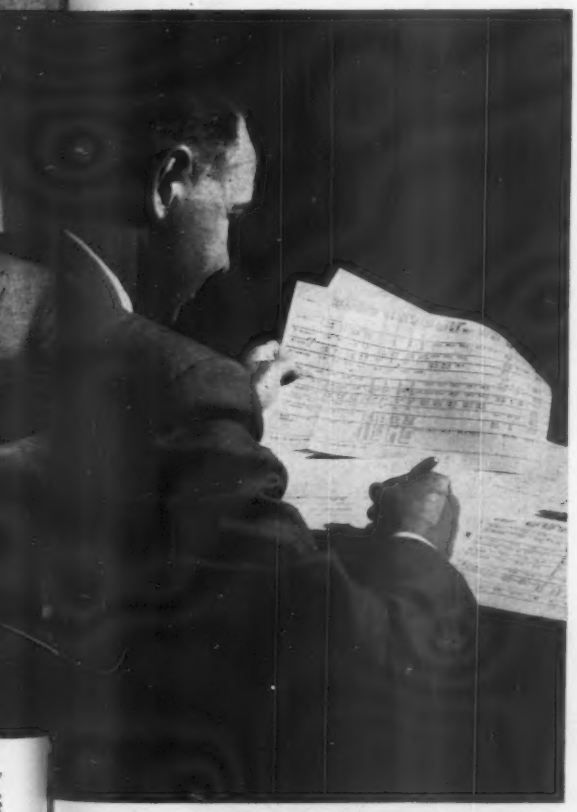
At Central Control, O. W. Johanson, Laboratory Supervisor, and Kenneth E. Holt, Control Director, inspect plastic test-solution containers for shipment to plant control labs across the country.

3 "The final sample is taken directly from the finished packages to make sure there was no contamination in pumping lines or shipping containers. It's tested for everything but flat feet, then filed. ADM uses over 400 analytical control methods . . . ranging from the old standbys to the latest instrumentation methods such as vapor phase and gas chromatography, infrared and ultraviolet spectrophotometry, and emission spectroscopy.

4 "To eliminate error and insure that all our plants make identical products, Central Control calibrates test equipment and furnishes exact procedures and specs. They even provide uniform testing solutions to all labs, which to me symbolizes the extreme care used all along the line.

1 "You can count the firms that have anything comparable to our control setup on the fingers of a first baseman's mitt. But surprisingly few people realize the immense responsiblity of control . . . or the meticulous detail involved.

2 "During processing this control panel shows what's happening inside the kettle. In addition, operators run frequent color, acid and viscosity tests. Of course, we start with raw materials. These must meet the rigid specs established by Central Control, which works closely with research, engineering, purchasing and sales from planning to finished product.



Just as Joe and Vera Naughton are confidently building their future on the quality of ADM products, so can you. It's all part of the ADM team operation. The Company's research staff creates new and better products . . . the men in its many plants use ultra-modern equipment and processing methods to produce products to rigid specifications. ADM technical representatives sell these products and provide customers top technical service.

And when these products are rushed to you in really clean containers, the specs are on-the-nose . . . the quality tops. Control engineers at every major ADM installation see to that . . . men like Joe Naughton, one of our 4,574 employees, who helps make ADM *easy to buy from.*

5 "Every month, for example, Central Control sends all 30 control labs a series of check samples. Results obtained on these are correlated back in Minneapolis and any deviation gets ironed out fast. This accent on accuracy has won us awards from the American Oil Chemists Society the past three years."

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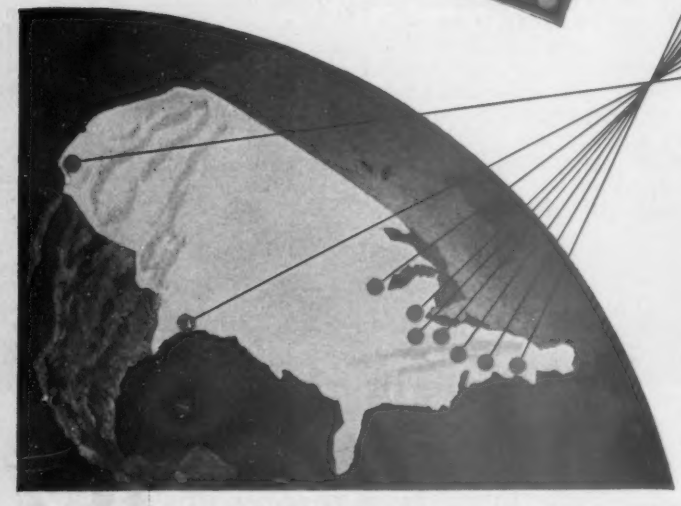

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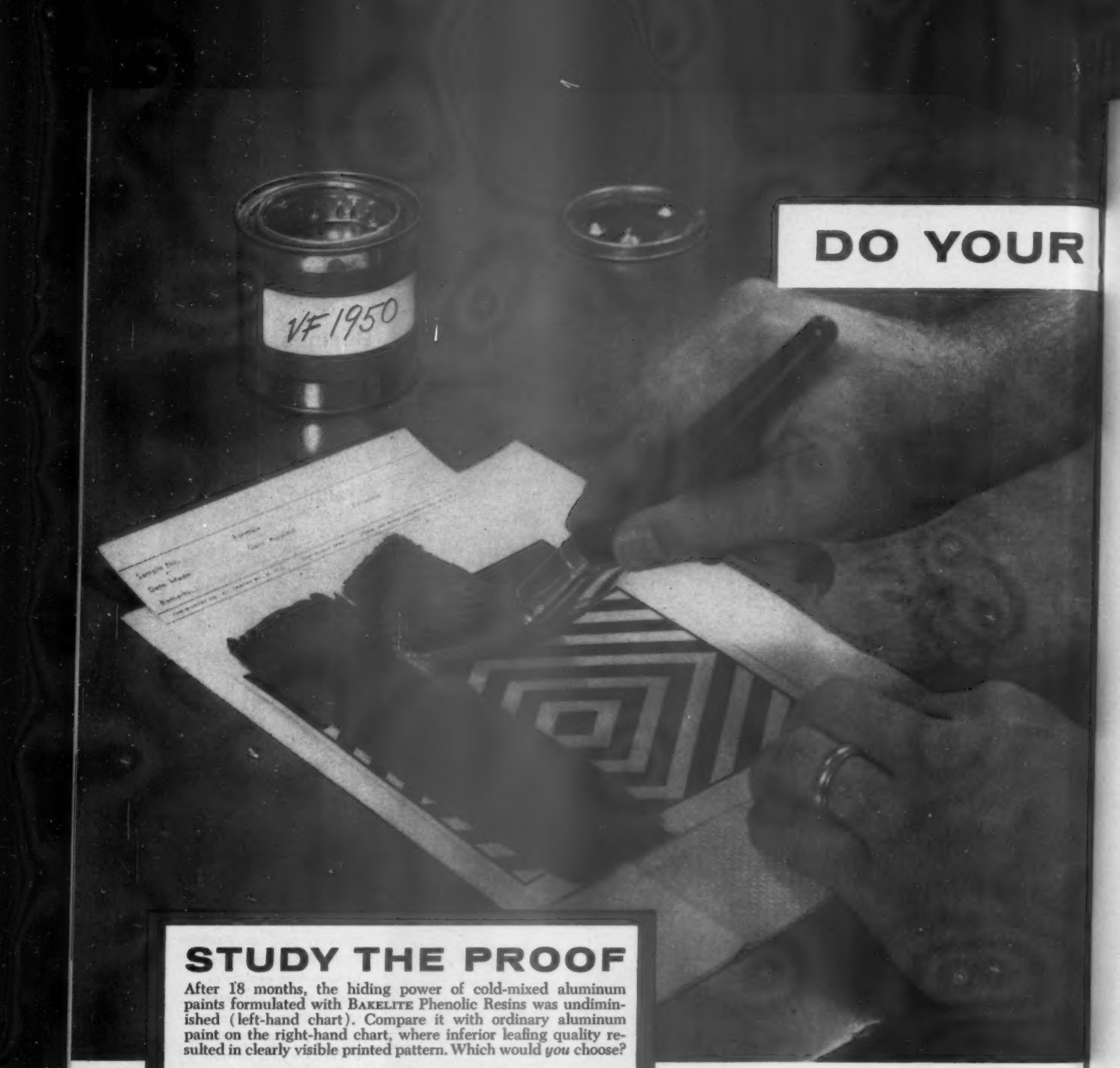


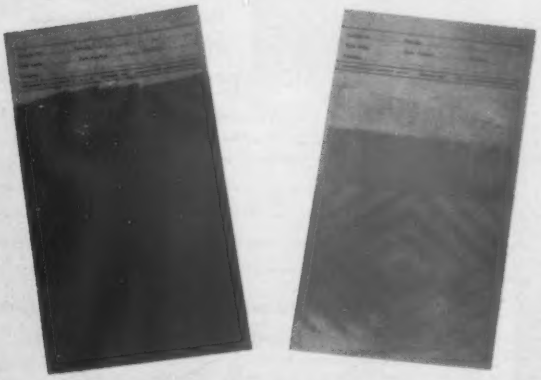
STUDY THE PROOF

After 18 months, the hiding power of cold-mixed aluminum paints formulated with BAKELITE Phenolic Resins was undiminished (left-hand chart). Compare it with ordinary aluminum paint on the right-hand chart, where inferior leafing quality resulted in clearly visible printed pattern. Which would *you* choose?

SUCCESS vs. FAILURE

with Bakelite Brand Phenolics

with conventional-base coatings



How this test was made:

Morest charts were coated by giving them a single stroke application of an alkyd-based ready-mixed aluminum paint, and one based on BAKELITE Phenolic Resin. The charts were photographed after 24 hours. Both paints had been stored in sealed cans for 18 months.

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Retention of leafing?

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VEHICLE: VF-1950, a 25 gallon, CKR-2400, 75% tung oil, 25% alkali refined linseed oil "cold blend" varnish

FORMULA:	POUNDS	GALLONS	PERCENTAGE BY WEIGHT
Aluminum Paste (65.5% N.V.)	200.8	16.26	24.44
VF-1950 (55.6% N.V.)	618.8	83.49	75.33
6% Cobalt Drier	1.9	0.25	0.23
THEORETICAL YIELD	821.5	100.00	100.00

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This is another application of the economical "cold mix" technique developed by Bakelite Company. Ready-mixed aluminum paints based on BAKELITE Brand Phenolic Resins combine low-cost production...superior retention of leafing, even after 18 months storage. They also have improved hiding power, superior reflection, long shelf life, and excellent resistance to outdoor weathering. Talk to your Bakelite Company representative or mail the coupon below.

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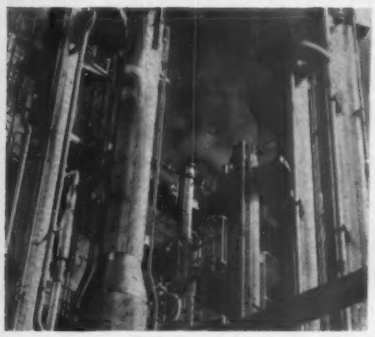
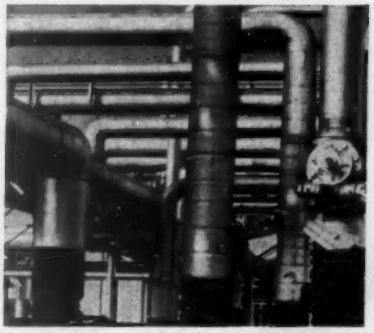


Reflection life gives these paints a big market in oil refineries. They stay bright throughout long periods of exposure to sun, weather, and corrosive atmospheres.

Years of service in protecting the San Francisco Bay Bridge against chemicals, weather, corrosion, and physical wear highlight the economy of these coatings.



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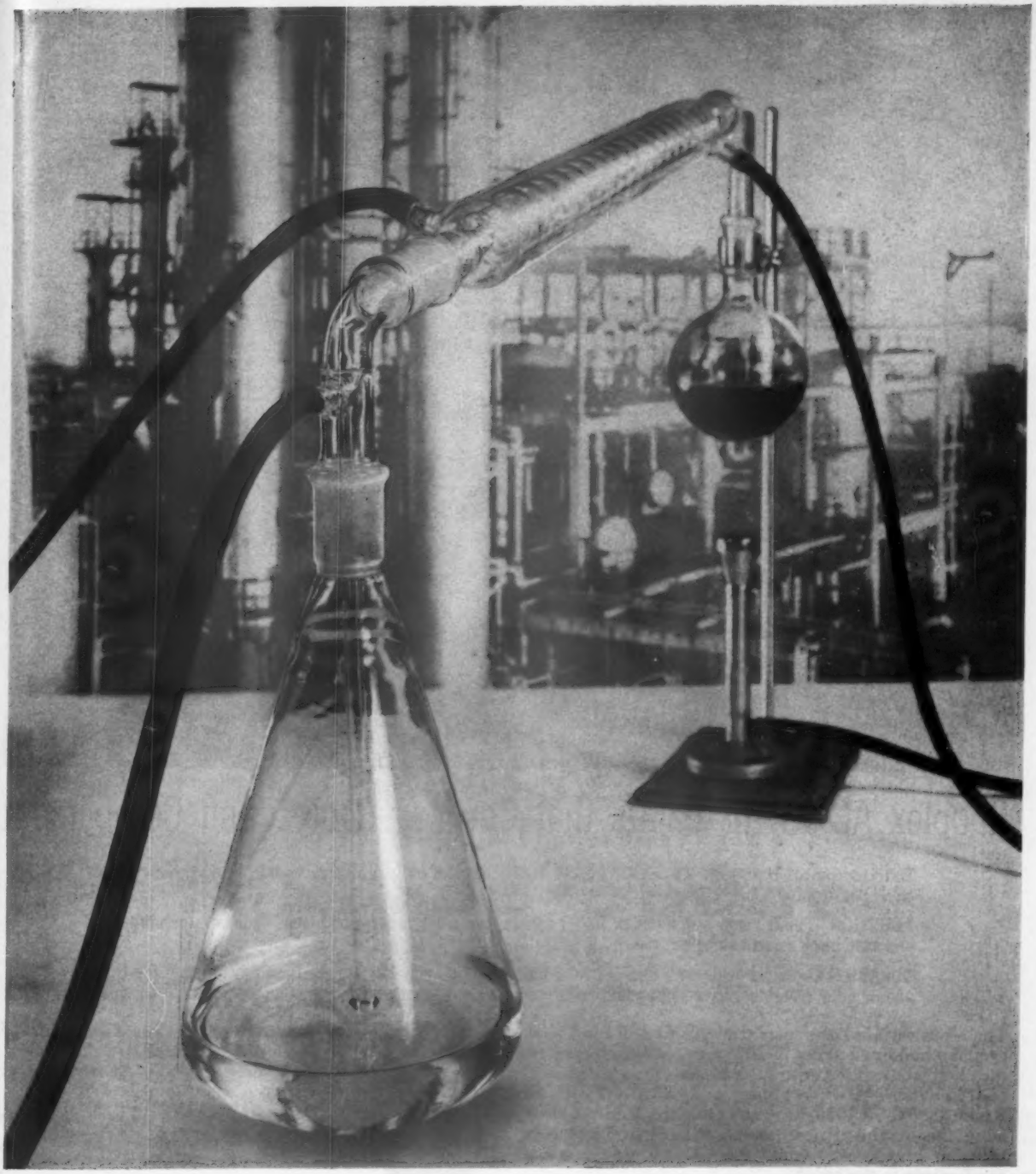

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XX-505	SPICULES MULTI-FACETS	MEDIUM LARGE	18
XX-601	ACICULARS	MEDIUM LARGE	14
XX-602	ACICULARS	LARGE	18

LEADED

GRADES	WHITE LEAD CONTENT %	PARTICLES	OIL DEMANDS
Lehigh-6	35	CO-FUMED	12
Lehigh-61	35	BLENDED	14
Lehigh-635	35	ACICULAR	13
Lehigh-250	50	BLENDED	12

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Neo Spectra Mark II	220	257	95	Standard, quality black; easy to disperse.
Super Spectra®	216	277	95	High blackness
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Superba®	191	180	95	Medium blackness; good quality, economy
No. 999	175	176	102	Intermediate all-purpose black
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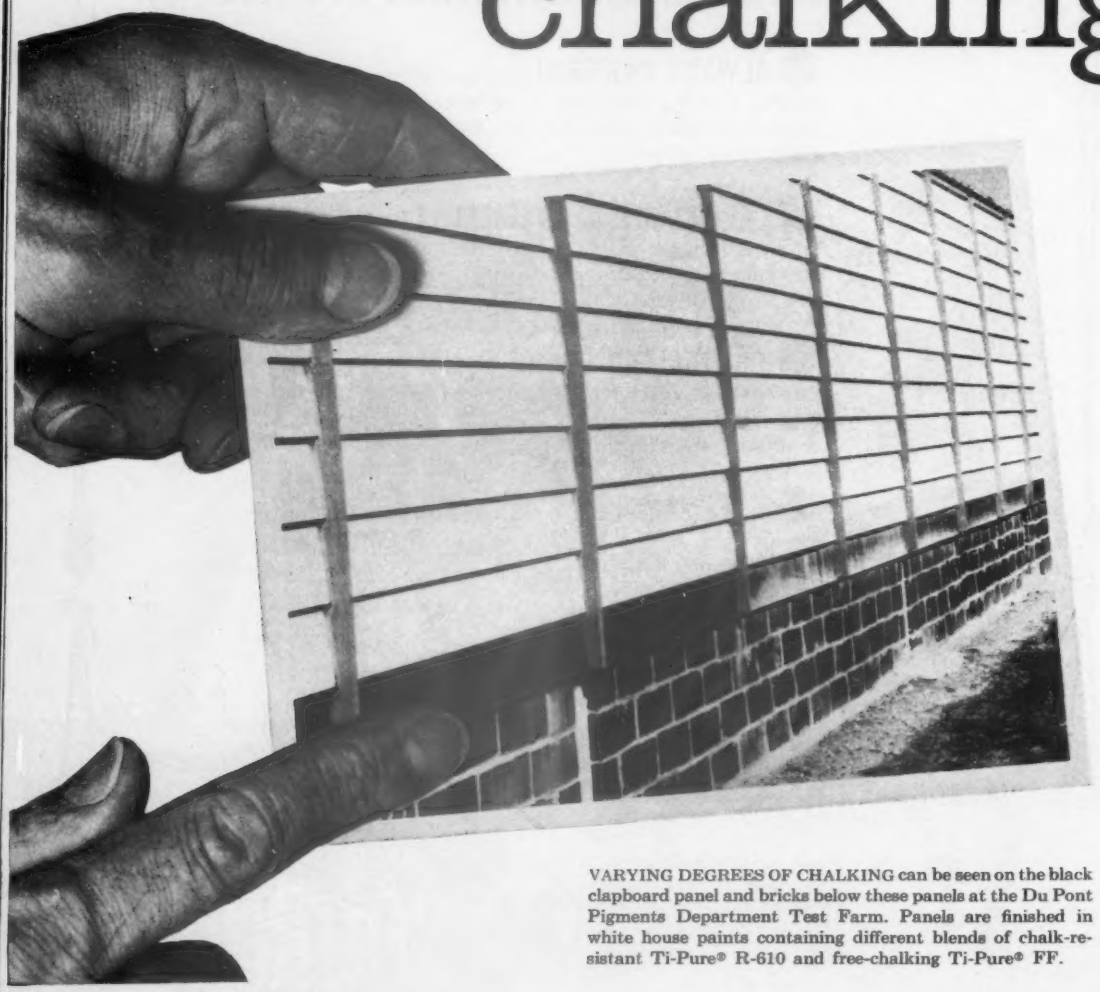

VARYING DEGREES OF CHALKING can be seen on the black clapboard panel and bricks below these panels at the Du Pont Pigments Department Test Farm. Panels are finished in white house paints containing different blends of chalk-resistant Ti-Pure® R-610 and free-chalking Ti-Pure® FF.

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TYPICAL PROPERTIES

Volatility -	Distillation Range, °F - IBP	340
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	50%	360
	90%	371
	ASTM End Pt.	405
	Drying Time	200 minutes (Toluol, 20 minutes, under same test conditions).
	Flash Point, TCC °F	120
Solvent Power -	Aniline Point, °F	184
	Kauri Butanol No.	26
Weight -	Gravity, °API	55.5
	Gravity, Specific 60/60°F	.7567
	Gravity, lbs/gal 60°F	6.30
Purity -	Sovasol 35 is water white in color and passes all pertinent stability and copper corrosion tests. It is practically odorless, is doctor sweet and is relatively color stable.	
Handling Precautions -	Safety - Combustible liquid. Avoid heat or open flame.	
	Toxicity - Relatively low order of toxicity but avoid prolonged contact with skin or excessive inhalation of vapors. (Further details upon request.)	
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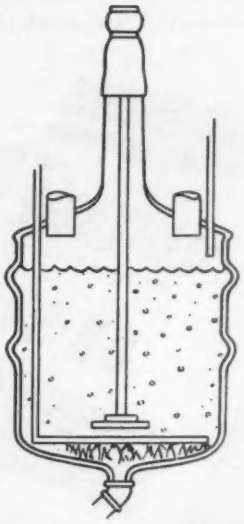

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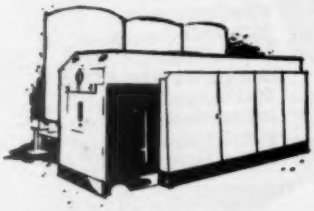

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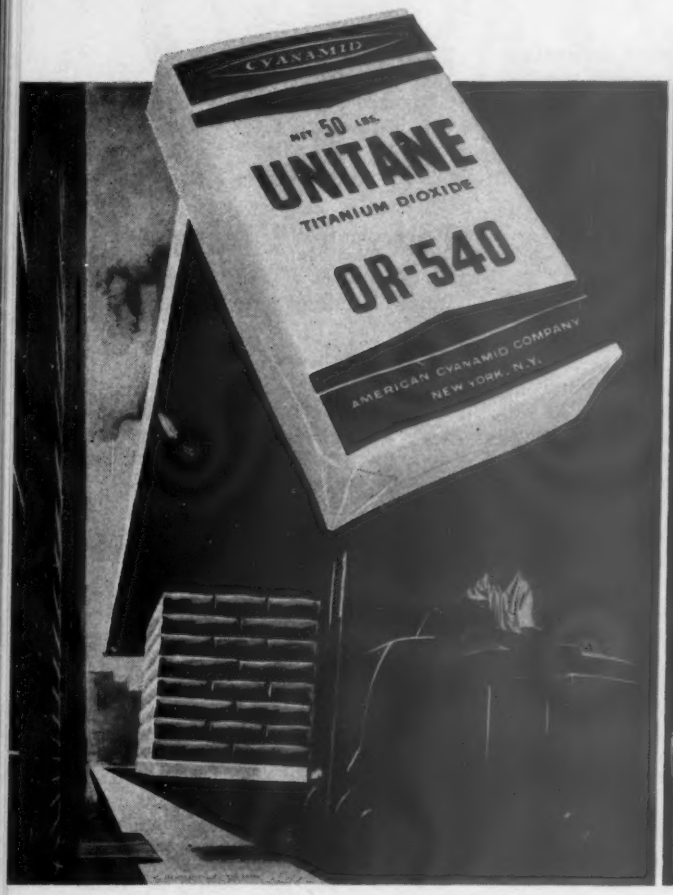

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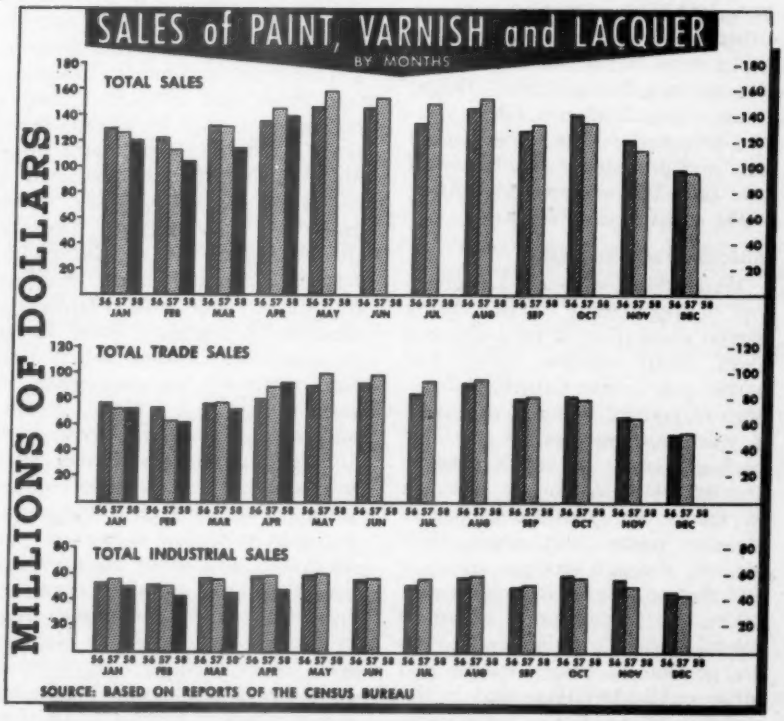
NEW DEVELOPMENTS IN SURFACE COATINGS

By
J. C. Weaver*

THE paint industry continues to decorate and protect a large proportion of all construction and to meet new requirements as they develop. The paint industry is strong and stable and is partly depression proof. Whereas some of the heavy industries have been depressed in recent months as much as 50 per cent, the paint industry in the first quarter of 1958 was only 7.4 per cent below the first quarter of 1957. This is an average of only a 2 per cent dip in trade sales paints and 14 per cent in industrial finishes.

The $1.6 billion paint industry continues to grow steadily even though it may not always keep pace with some of the increases in gross national product. About one-half billion gallons may be the volume represented by this value, although figures from the Bureau of Census and elsewhere leave some doubt as to the exact gallonage produced. A half billion gallons, at a typical spreading rate of 500 square feet per gallon is enough to cover the State of Maryland, or more than enough to cover New Jersey. This spreading rate amounts to about 3 mils wet film thickness, or more than 1 mil dry film thickness and emphasizes the user's faith in accomplishing so much with so little.



Paint sales for 1956, 1957, and first four months of 1958.

Paint users take for granted several years of decoration and protection from a few mils of paint film and assume that practically any surface is paintable. They are never long satisfied and paint

*Vehicle-Research Coordinator, Sherwin-Williams Co., Cleveland, Ohio. This paper was presented before the Spring Meeting of the Commercial Chemical Development Assoc. in Niagara Falls, N. Y.

chemists never find monotony in developing improvements in the many facets of the paint industry.

One-half billion gallons of paint covers state of Maryland.

About 60 per cent of all paint made is classified as trade sales and the remaining 40 per cent as industrial. The construction industry is concerned with each of these in various ways. Painter subcontracters use trade sales type paints on new construction as well as old. Industries which supply materials of construction may use either type, either air dried or baked parts, on pre-fabricated modules, or on sub-assemblies. Baked enamels on aluminum siding, factory primed panels of pressed wood fiber and prefinished shakes are all part of a further industrialization of the construction industry.

Multicolored Finishes

Multicolored enamels are growing in popularity. They bring partial realization of time-honored jokes about checker board and barber-pole paints. Growing knowledge of control of surface tension in paint systems has led to single package paints in which discrete droplets of paints in any selection of colors are suspended in an aqueous phase, and retain their identity through storage, spraying and drying to give various accent colors on backgrounds of other colors. These multicolored paints are popular in stores, motels and other public buildings and in the rapid finishing of the interiors of low cost homes in large housing developments, and are believed to have reached multimillion dollar sales. By masking out windows and other openings, operators with spray equipment can quickly transform an interior in one coat, while hiding surface irregularities due to dry wall construction. The early successful formulations in multicolor were in nitrocellulose lacquer, along with conventional and odorous solvents. Recently non-lacquer vehicles employing odorless mineral spirits have been used in multicolor formulations.

No Painting?

Trends away from paint on construction surfaces are claimed for a variety of reasons such as odor, toxicity, messiness in the painting operation, high labor cost of application and alleged lack of permanence. Some of these reasons may persist, but others will fall with the test of time.

New glamour surfaces are given high ratings for permanence and claimed to need no painting. Some of these claims may have been merely spot checked for a few years, whereas a conservative and experienced house paint formulator will have conducted full scale house tests across the country at locations selected to cover combined effects of temperature, humidity, rainfall, mildew, wind erosion, dirt collection and industrial fumes. One illustration of partial disillusionment is seen in styrene-polyester panels reinforced with glass fibers for which was predicted a useful life of twenty years. This prediction may become true for the structural life of the panel, but earlier crazing and chalking of the surface and yellowing throughout suggests some limits on appearance claims and a need for continued improvements in resin formulation. Good appearance is prolonged by covering with a clear, light-stable lacquer such as those based on acrylic copolymers. The same clear lacquer is useful in protecting aluminum window sash and other architectural pieces against alkaline corrosion by mortar and against industrial and urban atmospheres. Stainless steel for exposed surfaces of public buildings competes with traditional stone masonry more that it does with paint, but we are intrigued to receive inquiries for paint which will stick to and decorate stainless steel. Asbestos-cement shingles were installed with some customers expecting no painting in the future. Then a desire for a new, brighter appearance against an experience of dirt collection led to painting of these also.

Application Methods

Application methods continue to make advances. In addition to brush, spray, electrostatic spray, dip, flow, roller coat, knife and squeegee, there is a rather new process for which one trade name is "Whirlclad". Powdered thermoplastic resins, usually pigmented, are held in fluffed suspension by a gentle air flow from below, while preheated parts of objects are dipped into the fluffed resin for a few seconds, withdrawn and allowed to cool. A rather uniform thick layer of resin particles fuse and adhere to the surface of the object as an essentially impervious coating. The air-borne fluidity of solid particles thus give the effect of liquid paint. The process appears useful on small objects and within the limits of the available thermoplastic resins. Whether it can compete with conventional paint systems on large production line facilities remains to be seen.

Fire Retardant Paints

Fire retardant and non-flammable paints rise intermittently in interest for maintenance purposes in public buildings, but there is no persistant, universal demand for them in non-military use. Those few paints which have been offered as non-flammable or fire retardant were generally unsatisfactory in some other respect such as price, appearance or durability. If and when a more insistant demand arises for fire retardant paints, there will be need for air-drying paints based on polymers more versatile and lower in cost than the vinyls and other currently available chlorinated compounds and the silicones.

Vinyl Coatings

Vinyl coatings have been in limited use for a long time. Solution type polyvinyl chloride and its copolymers have enjoyed a steady growth since the late thirties in special corrosion resistant applications such as can linings, cement service hopper cars and chemical plant maintenance which can afford the relatively high cost solvents required. Vinyl plastisols are of more importance and prom-

se. The rubber companies have made notable advances with vinyl sheets, coating and textiles. Plastisols might just as well be recognized as an improved type of paint which will penetrate more and more areas of paint use. There continues an active competition between the lamination of a vinyl sheet onto steel and other objects, and the application of the same kind of a thick coating by way of plastisol formulation. Embossing and forming of vinyl-coated flat sheet are attractive in many uses, but are not rapidly displacing the long established and low cost wrinkle and hammer finishes.

Vinyls as thick coatings for architectural panels offer a great deal in prolonged resistance to wear and dirt accumulation. But long life of these coatings merely postpones a desire for change in decoration schemes and ultimately offers an opportunity and problem in covering them by conventional paints.

Paints for Wood

Wood continues to be a major material of home construction in the face of mounting competition by structural metal, aluminum siding, asbestos-cement shingles and various forms of masonry. Formulation of house paint is so long established that the public takes for granted good appearance for five to seven years from a 2-coat system. Yet problems do persist in house paint, and notably in two respects. Methods of tighter house wall construction, use of more thermal insulation and warmer, more humid interiors combine to increase blistering of paint on exterior surfaces. Vapor barriers near the inner wall surface, ventilation behind the wooden siding and priming with paint the back of the siding all help in part to combat the underlying causes.

Producers of lumber from southern yellow pine recognize it to have special problems in paint-ability and durability of paint films thereon. This difficulty may be associated with the broad resin streaks in yellow pine and with the poor exterior durability of rosin derived from it. The paint industry has a long history of improving the durability of rosin by treatment with a variety of things including lime, zinc oxide, glycerine and penetarythritol, maleic anhydride, phenolic resins and tung oil. It is here suggested that the shortcomings of yellow pine offer a challenge to the chemical industry to find a chemical means to treat yellow pine economically in the kiln so that it is not only more stable dimensionally, but more uniform of surface and receptive to paint.

Masonry Paints

Concrete blocks' rapid expansion in use creates a range of challenges and opportunities for paint on both interior and exterior walls. Numerous formulating approaches are actively being pursued toward a variety of end uses on concrete blocks and related monolithic concrete and stucco. The uses range from swimming pools and river dams through highways, parking garages and airport landing strips to ranch style homes where the occupant wants to put the paint on himself, either initially or to cover up a hasty painting job by the building contractor. The performance problems include not only the high alkalinity of portland cement, but the gross porosity of the concrete, the fine structure of course aggregate, freeze-thaw spalling on northern highways, efflorescence most anywhere and mildew conditions encountered in the humid south. It is not surprising then that the success of any paint for concrete depends as much on how it is sold and used as on how it is formulated.

Formulations cover quite a range of compositions. Heavy duty uses such as meat packing houses, dairies, breweries and the like find good service in paints based on phenol-epoxy resins which are catalyzed just before use by amines, polyamides or other reactants with the epoxy components. Sanitary requirements include coverage of mortar joints, low porosity of the cured paint and low residual toxicity of paint ingredients. Bactericidal paints are sought as an extension of this end use for hospitals as well as buildings related to food production. Most concrete blocks are so coarse in texture that a filler coat is necessary for uniformity of appearance of the top coat. Adhesive and cohesive strengths of epoxy based paints are generally greater than the strength of the block itself.

Swimming pools and patios represent intermediate duty requirements which have been met for years based on chlorinated rubber and on cyclized rubber.

Highway traffic paint is a large and ever-growing market, mainly with the governments of the various states. The trend in some states toward striping the edges of highways for safety reasons would more than triple the paint requirements per mile of highway. Such increases along with continuing increases in highway construction are pleasantly staggering to the imagination of paint manufacturers. Traffic paint formula requirements vary widely from state to state, with alkyds holding a leading position followed by the older oleo resinous vehicles, and those based on chlorinated rubber, on cyclized rubber, on Batu natural resin and on so-called dispersion resins which are semi-gelled dispersions in typical hydrocarbon solvents. State highway purchasing departments are tending more and more toward a rigid evaluation program wherein traffic paint is rated in terms of cost per mile per day of useful life. Competition for this large business is very keen.

Isocyanate adducts are said to combine phenomenal adhesion to damp as well as dry concrete with abrasion resistance many times that of conventional vehicles. Rapid developments are expected in this field.

Light duty requirements for paint on concrete blocks above and below grade in homes is tending more and more toward latex-type formulations. No single type of latex is outstandingly better than another, and it is worth repeating that the way the paint is used as important as its formulation. The excellent adhesion of most latices to concrete widens the opportunity for paint sales, since pores are filled and cracks are patched, even in thin films by mixtures of portland cement and one of the latices. Feathered edges have much better adhesion when the patching material contains latex. Most formulation problems of latex paints for concrete center around the variables of intended use. Choice

and amounts of necessary thickeners, surfactants, mildewcides, etc. are all balances between cost and degree of hazard at the point of use. Florida, Texas and California are all active testing grounds of these paints.

A final type of paint for concrete deserving of mention is that which will withstand nuclear radiation encountered in "swimming pool" reactors and associated apparatus in atomic energy research and power facilities. It is fervently hoped that uses of paint for this purpose can be kept to a peacefully low level.

Alkyd Coatings

Alkyds constitute almost half of the more than 800 million pounds of resins used in coatings. Alkyds will continue as the major vehicle of the paint industry for some years to come. Their flexibility in formulation gives such versatility in performance that it will be many years before the host of new polymers based on other systems can crowd them out of coatings uses. They are important in house paint colors and trim paints and in many miscellaneous exterior finishes as well as in the long established trade sales interior enamels, for appliances and for baking enamels.

The principles of molecular architecture laid down by Carothers and others are being well used, not only in dacron and related textile type polyesters, but in coatings alkyds as well. After over 30 years of ever increasing use in paint, alkyd molecules are still being carefully tailored by resin chemists to do a better job. They labor over high polymer techniques and carefully select qualities of alkyd ingredients to high, medium or at least different performance requirements.

Most ingredients of alkyds are in excellent supply and can continue in economic competition with other types of monomers. There is no forseeable shortage in naphthalene or the xylene isomers which supply the ever increasing capacity for manufacture of phthalic anhydride and isophthalic acid. Pentaerythritol and glycerine capacities are very ample as are those of the several glycols. Newer introductions of trimethylol ethane and trimethylol propane appear to be gaining acceptance. Increasing production of sebacic, isosebacic, azelaic, adipic, fumaric, maleic and benzoic acids add to the almost bewildering choice from which to tailor-make specialized resins.

Oil-free alkyds are gaining acceptance in extremely white, nonyellowing baking enamels, primarily for appliances, but potentially at least for architectural panels. The weakest links in alkyd chains may be at unreacted or residual hydroxyl and acid groups. Reacting these with diisocyanates serves not only to cover them in a scavenging sense, but goes further in improving very markedly the resistance of the alkyd to wear and to hydrolysis. This and other alkyd modifiers such as styrene will enhance and extend the use of alkyds in coatings in future years in ways perhaps undreamed of by those who worked with them 30 years ago. If alkyds do disappear, it will be only gradually through their modifiers becoming dominant parts of the coating vehicles.

Consideration of alkyds would not be complete without reference to their use in water dispersed paints. Such dispersible alkyds as offered in the 1930's were ahead of their time, but increasing fire safety consciousness in the automobile industry has focused attention on water-reducible primers, among which alkyds are leading contenders. Success of water-reducible primers and even of one coat systems for metal is already sufficient to assure a lot more research in this field with extension to use in metals for construction.

Water Paints Surge On

Water based paints are obviously expanding. The early and admirable development work on the butadiene-styrene system has paid off well, with some guesses that the current rate of production of this type of paint is approaching 50 million gallons per year. Polyvinyl acetate had an early start in paint in Germany, while much later acceptance in the United States is now gaining momentum, partly on new business and perhaps partly at the expense of butadiene-styrene. The acrylic latex paints at higher prices continue to give good performance. Rather than dwell on the relative merits of these polymers and their respective monomers, it is suggested that the chemical industry give more attention to improved thickeners and surfactants which are necessary to any latex-type paint. A long history of thickeners of commercial importance still places emphasis on more or less natural products such as casein, corn and soya proteins, alginates and the cellulose modifications. A few strictly synthetic thickeners such as polyacrylic acid and polyvinyl alcohol are gaining importance and further attention to this field is suggested. Both large and small paint makers are attracted to the economics of making their own latex from vinyl acetate and other monomers not requiring pressure vessels. This trend is normal and consistent with their years-long practice of making their own varnishes and related paint vehicles. Paint and varnish chemists will develop a big and complicated technology on the use of thickeners and surfactants and consequent effects on viscosity at high and low shear rates. Suppliers of chemicals for these purposes have wide opportunities to work with them to their mutual profit.

Styrene Gains Noted

Styrene is already a major component of paint and promises to become one of the most important in the decades to come, simply because it gives a fine balance between low cost and high performance in toughness and hardness. Just as rosin was the great hardener and cheapener of paint in the first half of this century, so will styrene and its near relatives such as vinyltoluene, take an important place in paint in the second half of this century. The comparison between styrene and rosin is especially meaningful because neither one alone is capable of creating a top quality paint for practically any purpose. Yet in their respective half centuries, each has been very abundant at low cost and each has been very versatile in formulation. Although prophets keep forecasting the death of wood rosin and the removal of all rosin

(*Turn to page 104*)

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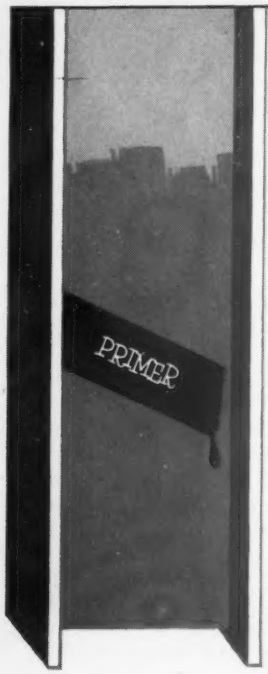

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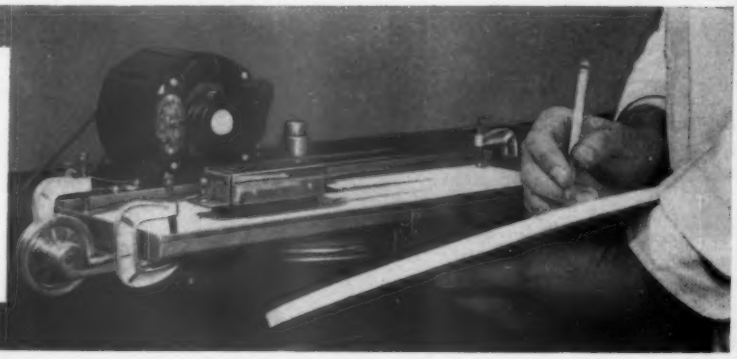

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PROGRESS IN FINISHING METHODS

Automobiles

By
Walter E. Mitchell*

PROGRESS IN THE METHODS OF APPLYING COATING AS SEEN BY CONSUMERS IN THREE IMPORTANT INDUSTRIES—AUTOMOTIVE, FURNITURE, AND AIRCRAFT—WAS PRESENTED AT THE CHEMICAL COATINGS TECHNICAL COMMITTEE MEETING OF THE NATIONAL PAINT, VARNISH AND LACQUER ASSOC. IN CHICAGO, MAY 14, 1958.

It is common knowledge that since the middle and late 20's General Motors has used nitrocellulose lacquer as the topcoat on their passenger cars. Now we are not here to debate the merits of lacquer vs enamel, so we mention our use of lacquer only to provide the background for discussion of applying paint coatings to automobile bodies.

Nitrocellulose lacquer must be atomized and propelled to the surface of the work by one means or another, since the rapid drying characteristics of lacquer make brushing difficult if not entirely impractical. The most convenient means of applying lacquer (at this writing) seems to be the use of a pneumatic spray gun, although it is by far the most wasteful. We estimate that at least 45% of the paint that is sprayed is lost in overspray and bounce-back. This amounts to many millions of dollars per year when translated into Fisher Body's usage of paint materials. In addition, there is the added expense in collecting the overspray and removing it from the plant, which is a sizable bill in itself. Disposal of spray waste is becoming a more serious problem daily, as some of it is quite flammable.

It would therefore seem in order to investigate other means of applying paint, so as to recapture some of this money now being totally wasted.

There are other fairly common means of painting, namely:

1. Electrostatic
2. Airless
3. Dip
4. Flow coat

Electrostatic Spray

We have used, and are presently experimenting with, various systems of electrostatic spray. It is our feeling that electrostatic has a brighter future in materials which are comparatively less flammable than nitrocellulose or acrylic lacquer. We know that electrostatic is used in some industries in connection with lacquer operations; however, in the case of an automobile body, with the possibilities of doors opening and producing an arc, we have not felt this process to be within the scope of safe practices. In our laboratories, using an airless gun charged with a conventional electrostatic apparatus, spraying a material higher in flash point than lacquer solvents, we were able to induce combustion by deliberately swinging the work into the field close enough to draw an arc. The combustion was sustained as long as the gun trigger was held open.

We are experimenting with electrostatic with undercoats or primers, and we feel that there is much to learn and some saving to be made in this area. Our experiments are

(Turn to page 101)

*General Administrator, Paint standards Activity, Fisher Body Div., General Motors Corp.

PROGRESS IN FINISHING METHODS

Furniture

By
Charles S. Powell*

THE R-way Furniture Company manufactures a line of bedroom and dining room furniture which they sell through company owned showfloors in most of the larger cities of the country.

After the close of World War 11, raw material shortages were no longer a problem, the factory attempted to improve the quantity of the R-way Furniture finish by applying a heavier coat of lacquer. This situation was encouraged by the sales department who reported that R-way customers were partial to a full hand-rubbed finish, particularly on table tops. In response to this request the factory went from one coat of sealer and three coats of cold lacquer to four coats of cold lacquer.

However, there was always a struggle between the different departments in the plant. The sales department demanded a smoother finish with absoutely no open pores. The rubbing room, with a rash of rubbed-thru tops on their hands, complained that the finishing department was not applying enough lacquer, while the finishing room complained that the rubbing room was rubbing the furniture too hard.

An attempt was made to double-coat the tops of our chests and tables, but this resulted in a defect known as blistering where the lacquer was full of minute air bubbles which show up as white spots during the rubbing operation.

Hot Spray Method

This was the situation when we heard about the revival of hot spray lacquer about 1950. We obtained a unit on trial and changed our last coat of lacquer over to hot lacquer at 28% solids, spraying it at 160°F. This gave us about 60% more lacquer solids on the last coat than we had obtained with the cold lacquer formerly used. There was one disadvantage however, in that it took longer to spray out a case with hot lacquer than with the cold because of the necessity of spraying hot lacquer slower and over-lapping each piece to a greater extent.

After a number of experiments we finally changed our finishing procedure so that we were spraying one coat of cold lacquer and two coats of 26% solid hot lacquer. At the same time, a higher viscosity of nitrocellulose was used to increase the viscosity in the finished lacquer. This change, incidently, gives increased cold-check resistance.

The above procedure gave us the following advantages over previous methods of application:

Spraying—By eliminating one coat of lacquer, a reduction of 25% has been effected in the labor costs of this operation.

Rubbing—Although hot lacquer produces a smoother surface than cold lacquer and is easier to rub, this fact is not reflected in lower rubbing costs but rather in better quality and less "rubbed through" tops which require re-coating.

(*Turn to page 103*)

PROGRESS IN FINISHING METHODS

Aircraft

By
J. C. Weaver*

FOR many years, the aircraft industry used primarily an air drying finishing system applied by conventional air spray consisting of alkyd zinc chromate primer and cellulose nitrate lacquer top coats with some lesser usage of alkyd enamel top coats. These systems were entirely adequate at that time with sufficient adhesion characteristics, weathering resistance, flexibility, and resistance to oils, fuels, and salt water. As air speeds increased and take off and landing speeds, particularly on water, also increased, it was necessary to add a wash primer to the finishing system in order to increase adhesion of the system to a satisfactory level.

Major Problems

With the change over from reciprocating engines to jet engines and the almost immediate increase of speed to sonic and supersonic range with resultant higher altitudes, sudden temperature changes and higher skin stresses, the finishing system in use became entirely inadequate. Two major problems were encountered immediately. These were the inability of the finishing system to withstand contact with the diester lubricating oils used in jet engines and stress crazing of the systems resulting from a combination of increased skin stresses and sudden temperature changes. Investigation of these problems led to the use of epoxies and acrylic-nitrocellulose for sufficient diester oil resistance and a reduction in stress crazing tendencies. It was also found during this investigation that film thickness was a major factor for stress crazing which in turn led to consideration of other methods of paint application than conventional air spray in order to maintain closer film thickness control.

Airless Spray

Preliminary evaluation of various application methods indicated the airless spray methods to be the most feasible approach dependent upon some development work on the paints such as adjustment of the solvent balance to modify their characteristics for adaptability to this process. This application method operates on hydraulic rather than air pressure and materials are usually applied hot unless subject to thermal degradation. Due to absence of air at the nozzle, with resultant lack of agitation and aid to atomization, leveling properties in the materials are almost entirely dependent upon

(*Turn to page 103*)

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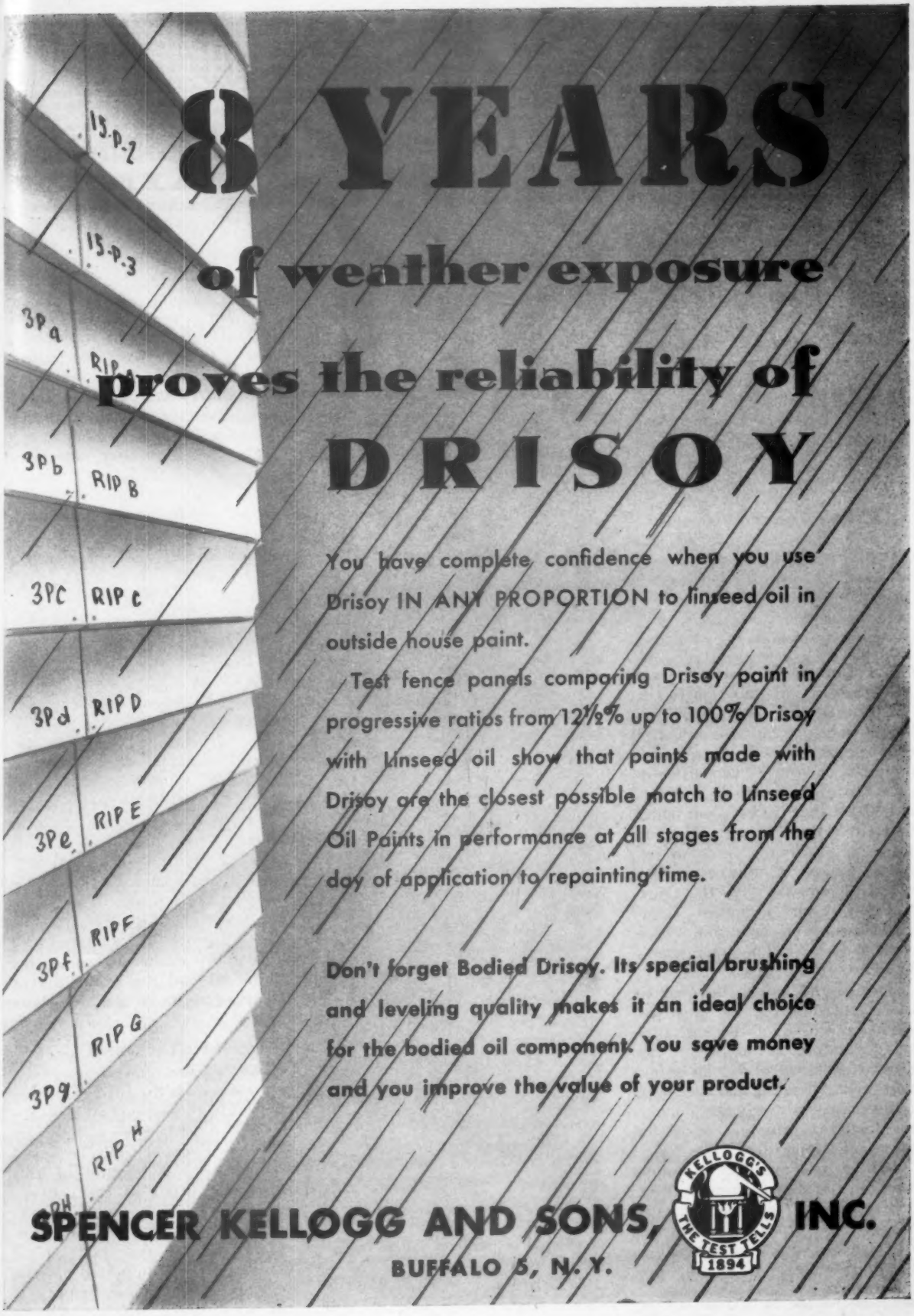
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EVALUATING BRUSHABILITY OF PAINTS

Quantitive evaluation of brushability based on R. C. I. Recorder

By
Ray Hawkins*
H. L. Wampner*

THE problem of assigning some quantitative gradation to the brushability of coatings has long been before the paint industry. One approach has been to determine the rheological properties of such coatings, especially to evaluate the changes which occur under different rates of shear and relate these to brushing ease. An excellent study of this type was recently reported by the New England Club Technical Committee[1] which was following up the work of Asbeck, Laidermann and Van Loo.[2]

Such studies, being devoted to the coatings themselves, must neglect the effects of the substrate being painted, the ability of the brush to hold the particular paint, the speed of painting and the many "personality factors" which make the relative evaluation of paints by several applicators differ.

In the past various attempts have been made to bring out these factors and evaluate them quantitatively by brush applications.[3] In some of these the "personality factors" brought in by the operator were eliminated by using mechanical application. Such methods neglect the one characteristic of a paint which is of paramount importance—the ease of producing a painted job of satisfactory appearance.

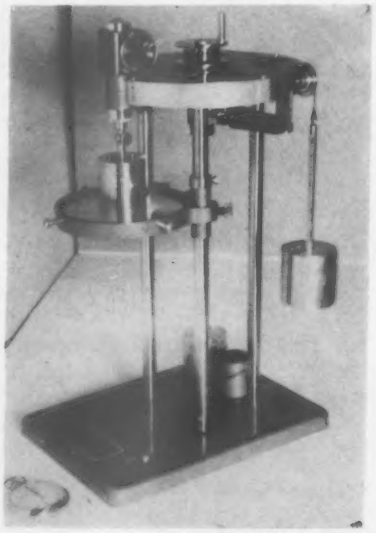


Figure 1. Stormer viscosimeter

In an attempt to allow all of the factors to play their parts and still arrive at a satisfactory answer, Dr. Harry W. Keenan and his coworkers at Beck-Koller & Co. (England) Ltd., Liverpool, developed an apparatus known in the U.S.A. as the R.C.I. Brushability Recorder. This equipment has been described in a private publication of Reichhold Chemicals, Inc. but no work has been reported on attempts to correlate the results from this instrument with other methods. This paper will, therefore, give data on the brushability evaluation using this equipment and the evaluation of the same paints by the high-shear method.

Description of Equipment

The high-shear viscosimeter used in these tests is the Blackie Instrument Co.'s[4] version of the apparatus described very fully by the New England Club Technical Committee.[1] A picture of this equipment fitted to the conventional Stormer is shown in Figure 1.

The R.C.I. Brushability Recorder can be described as an oscillating table supported by four pinioned links. While gravity is the main force which tends to

*Reichhold Chemicals, Inc., S. Francisco, Calif.

keep the table in dead-center position, it is assisted by four low strength springs which prevent oscillations of excessive amplitude.

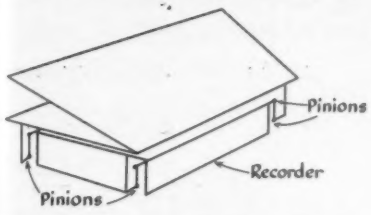


Figure 2. Schematic sketch of Brushability Recorder.

Movement of the table is transmitted to a pen which records the deflection and the time on a moving chart. Figure 2 is a schematic sketch of the arrangement of this equipment and Figure 3 shows the apparatus itself with the recorder drawer open. During operation the drawer must be closed to engage the pen. In the photograph the table is shown inclined approximately 30° to the horizontal,

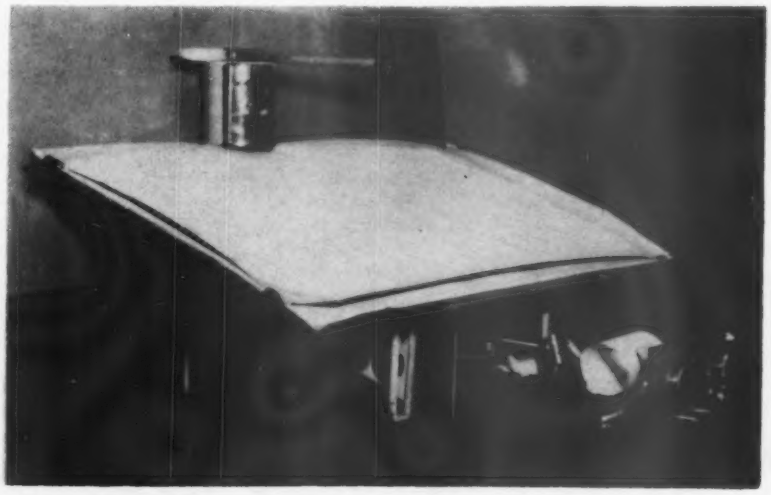


Figure 3. Brushability Recorder

but it can be positioned at several angles between horizontal and vertical. The angle used in our tests is that found most convenient by the operators.

The table may be any convenient material on which paint can be applied. The support shown is a 20 x 40 inch Upson board to which the various paintable surfaces are clipped by spring clamps. Some paints are to be applied to sealed surfaces. We have found that the glue side of prepasted wall paper[5] is uniform in performance and very convenient. The quality of the paper itself is apparently of minor importance but it should preferably not be embossed. This surface is not satisfactory for water paints so other types can be used. Kraft paper unselaed or sealed by spray coating, ¼″ Gypsum board, or any other similar material can be employed.

The area to be painted—in our case 16″ x 36″ to give 4 sq. ft.—is marked off on this sheet. These dimensions are also convenient in that approximately an 18″ brush stroke is about normal. For the application we prefer a good quality 2½″ bristle brush.[6] Experiments with 2 sq. ft. surfaces gave less variability between paints and operators with respect to the time required for coating. The larger surface generally took more than twice as long to coat and peculiarly required more than twice as much paint to give a satisfactory appearing surface.

Attempts were made to use a uniform technique of brushing between operators but even when the speed of brushing was regulated by a metronome, difference still existed between operators which can, at present, only be attributed to the intangible "personality factor".

The weight of paint applied in each experiment was determined by weighing the container and brush before and after a given application. With each change in paint the thoroughly cleaned brush was first "worked in" by brushing on a neutral surface before the initial weighing.

In the series of tests reported here, we used three house paints, three gloss enamels, three flat enamels and five poly(vinyl acetate) latex paints. All of these were formulated in the laboratory to produce paints which we knew from previous experience would differ in ease of brushing.

In addition to the numerical data collected, each paint was applied by a master-painter to sealed wall board—and in some cases also to unsealed wall board—to get his opinion on relative brushability.

Since brushing of the paints under practical conditions did not produce identical oscillations in the table for each brush stroke, the amount of deflection for each brushful of paint was averaged visually and then an over-all average for the total application was calculated from these unit figures.

Of possible interest to some is the fact that each unit of deflection on the chart is equal to approximately 70 grams of force applied in the direction of oscillation. This value would change if a different weight table or springs of different strength were used.

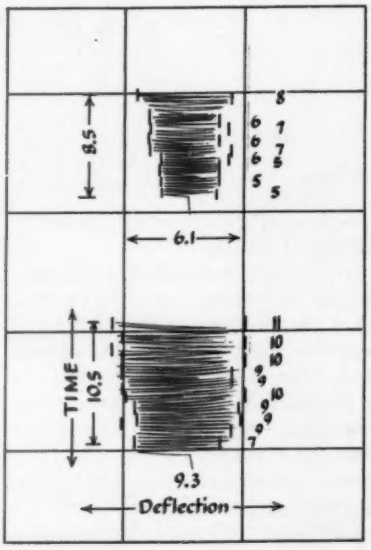


Figure 4. Typical chart of average deflections.

Elapsed time from the start to the finish of the operation was read to the nearest one half chart unit. This is equivalent to reading to the nearest 0.05 minute. Figure 4 shows a typical chart as it appears after averaging. The brushing of two paints is illustrated—the top section is for an easy brushing

All Tests at 77°F

Paint	KU	Hi-Shear Vis. Grams	Seconds	Surf*	Operator A Def*	Time	Wt*	Fact*	Operator B Def*	Time	Wt*	Fact*	Operator C Def*	Time	Wt*	Fact*	Master Painter Rating
House Paint Series																	
#1	81	1350	11.3	A	9.8	10.5	45	463	11.6	12.0	43	599	12.3	11.0	47	636	
		1450	10.5	B	9.5	10.0	45	428	11.5	12.0	40	552	10.6	10.5	46	512	Poor/D
		1550	9.7	C	9.6	10.5	48	454	12.4	11.5	47	670	13.2	10.0	47	620	
#2	76	1250	10.5	B	8.3	9.5	43	339	9.6	9.0	44	380	11.8	9.0	46	489	Fair/D
		1350	9.5														
#3	77	800	10.5	B	6.6	9.0	43	255	6.8	10.5	42	300	10.1	9.0	38	345	V.Good/D
		850	9.7														
Flat Wall Series																	
#4	82	950	10.3	A	6.4	8.0	53	271	7.6	9.5	54	390	9.4	7.5	51	360	Fair/D
		1050	9.2														
#5	82	900	10.7	A	5.9	9.0	45	239	6.1	9.5	44	255	7.5	8.5	43	274	V.Good/D
		950	10.0	B	5.9	8.5	42	211	5.8	9.5	41	226	—	—	—	—	V.Good/E
				D	4.6	8.0	37	136	4.6	10.0	34	156	6.3	8.0	35	176	
				E	5.0	10.0	49	245	5.7	9.5	48	260	6.3	11.5	43	312	
#6	104	850	10.5	A	6.0	9.0	39	211	6.8	10.5	37	264	9.0	9.5	42	359	Good/D
		900	10.0														Good/E

*NOTE: Surf: Surface painted. A: Sealed Wallpaper A; B: Sealed Wallpaper B; C: PVAc sealed Kraft; D: PVAc sealed Gypsum; E: Unsealed Gypsum; F: Unsealed Kraft

Def: Deflection in chart units. Time in chart units. Wt: Grams of paint to coat 4 sq. ft.

Fact: Brushability factor = $\frac{\text{def x time x wt.}}{10}$ Master Painter's Rating brushing on surface indicated by letter

Table 1. Brushability data of house paints and flat wall paints

All Tests at 77°F.

Paint	KU	High-Shear Vis. Grams	Seconds	Surf*	Operator A Def*	Time	Wt*	Fact*	Operator B Def*	Time	Wt*	Fact*	Operator C Def*	Time	Wt*	Fact*	Master Painter Rating
Gloss Enamel Series																	
#7	80	1750	10.2	B	8.1	10.5	41	349	8.7	11.5	42	420	12.4	11.0	49	546	Poor/D
		1850	9.5														
#8	81	650	10.5	B	5.8	7.5	36	157	6.8	8.5	34	197	7.2	8.0	36	207	V.Good/D
		700	9.5														
#9	82	1350	10.2	B	8.0	11.0	36	317	9.3	10.5	36	351	10.4	11.0	37	423	Fair-Good/D
		1450	9.5														
Poly(vinyl acetate) Series																	
#10	84	850	10.5	C	8.6	14.0	59	708	8.7	13.0	63	713	10.7	14.0	52	779	Poor/D
		950	9.2	F	7.4	17.0	78	981	9.4	17.0	61	975	9.5	18.0	72	1230	Poor/E
#11	87	600	11.5	C	7.0	14.0	57	559	6.3	12.0	45	340	8.6	10.0	50	430	Fair/D
		650	10.0	F	6.9	15.0	67	693	8.4	14.0	55	647	9.2	14.0	57	734	Fair/E
#12	76	400	10.5	C	5.1	10.0	35	178	5.4	10.5	33	187	6.5	10.0	35	228	V.Good/D
		450	9.0	F	5.7	12.0	50	342	7.2	13.0	50	468	7.3	11.5	48	493	Fair-Good/E
#13	76	400	10.5	C	4.9	11.0	45	243	5.4	11.0	36	214	6.1	10.5	37	237	Good/D
		450	9.3	F	5.9	14.0	50	413	8.1	12.0	46	447	6.6	13.0	48	412	V.Good/F
#14	88	600	10.5	C	6.4	13.0	46	383	7.4	11.0	46	374	7.2	12.0	38	328	Fair/D
		650	9.5	F	7.1	15.0	61	650	8.9	12.5	55	612	8.9	13.0	55	636	Good/E

* See abbreviations on Table #1.

Table 2. Brushability data of gloss enamels and polyvinyl acetate paints.

type and the lower is for one more difficult to brush.

In the RCI booklet on the Brushability Recorder, it is suggested that the product of the deflection and the time be taken as a factor and that this be converted to a brushability ratio by using some standard type paint—like white lead and linseed oil—as the common denominator for all tests. It was hoped that by this arrangement, differences between machine and operators could be eliminated.

We have not found this to be a fact in our own work. With certain paints all three operators would arrive at very similar values, whereas other paints would give quite divergent results. Also using only the deflection and the time in the equation disregards one important factor—the quantity of paint required to achieve a satisfactory appearing brush-out. In some of our tests this was the most important difference between paints of the same general group. It is one of the differences most noticeable between paints applied to sealed and unsealed surfaces. Because of these observations we prefer to use the product of the deflection, the time and the weight of paint applied.

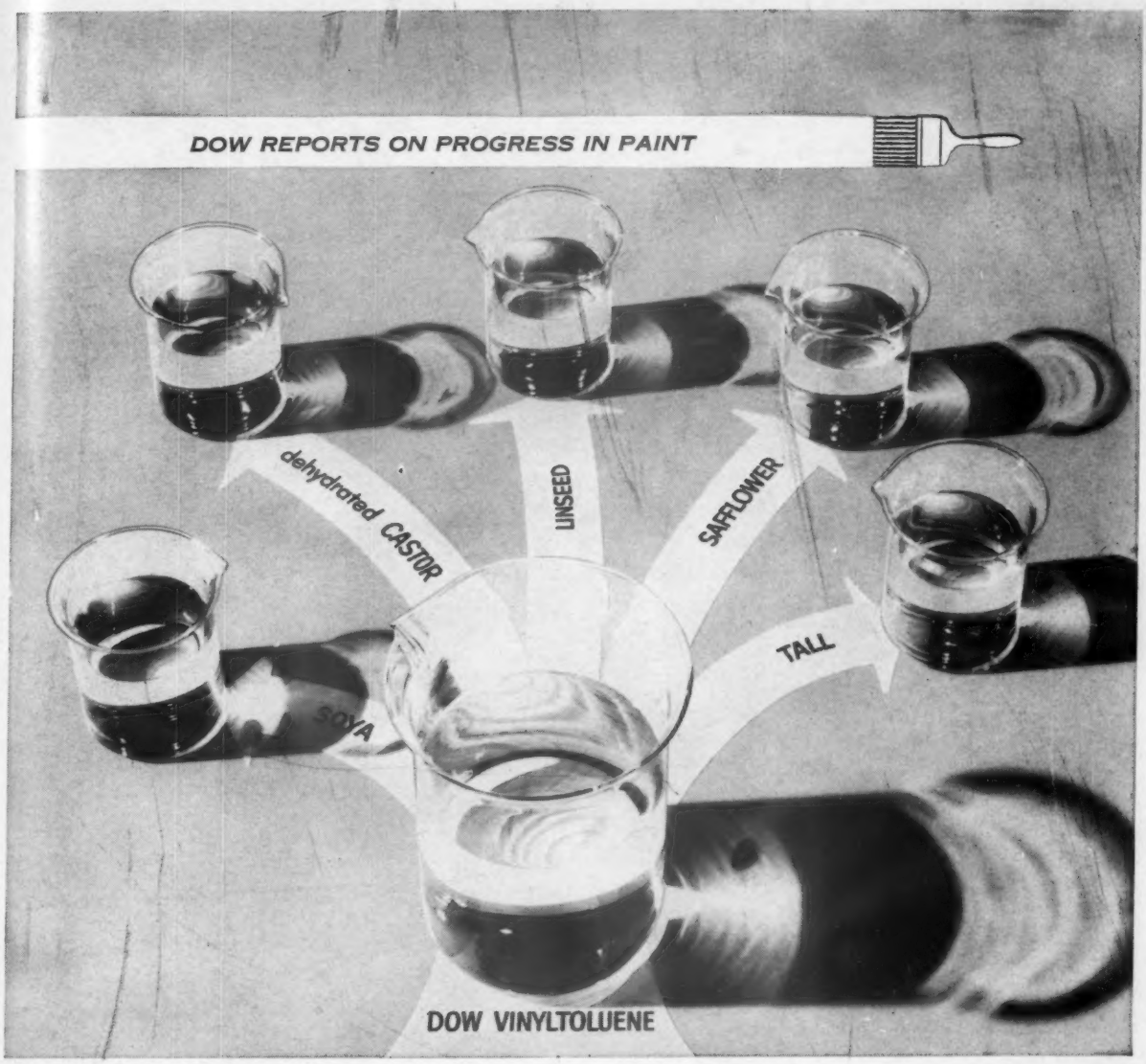
Results

Table 1 and 2 give the data collected on the fourteen paints used in these experiments. For those who would like to see the basic difference between paints in each class, a very brief description of each is given in an appendix. A better visual comparison of the relationship between the RCI Brushability factor and the high shear viscosity is given in Figures 5-9 where the "Factor" obtained by each operator (and the average of the three) is plotted against the grams required to give 100 revolutions of the Blackie instrument in 10 seconds.

Since the clearance between the stator and the rotor in the Blackie* is about 2.5 times as great as in the instrument used by the New England Club Technical Committee (0.01 inch versus 0.01 cm) the shear velocity at this point is only 3076 sec.$^{-1}$ whereas at the same revolutions/time they would have a shear velocity of 8260 sec.$^{-1}$

(Turn to page 105)

*An additional piece of information on our Blackie high-shear viscosimeter—as determined using two samples of viscosity standard hydrocarbon oils—is that the "K" factor is 0.0279. Poise viscosities at a shear velocity of 3076 sec.$^{-1}$ can therefore be calculated, if desired, for each of the paints used in these tests by multiplying the Hi-Shear Grams as given in Figures 5-9 by 0.00279.



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These properties are possible because Dow is a basic producer of epoxy raw materials and is able to assure quality control and a narrower range of specifications. For more technical data on Dow Solid and Liquid Epoxy Resins contact your local Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coatings Sales Department 2255K-1.

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EPOXY

YOU CAN DEPEND ON DOW

By
Phil Heiberger

The author continues his random reflections on various aspects of the paint industry. The opinions expressed in this column are his alone and do not necessarily reflect those of this publication.

Research Paths

THERE are several acceptable research paths to new knowledge. Each has unique advantages and the use of each is dictated by specific circumstances.

There are times, for example, when the hit-or-miss approach is less haphazard than its name would seem to imply. Often, on the other hand, a step-by-step approach is clearly indicated. Then, sometimesit'spossible to get closer to the truth by deliberately setting out to either prove or disprove a carefully thought out hypothesis.


P. Heiberger

Naturally, depending upon the wisdom of the researcher's choice and his luck in turning up the answers he seeks, various combinations of these principal approaches can be utilized.

Hit or Miss

T. G. Klumpp and C. M. Suter, writing in the March 1958 issue of *Industrial and Engineering Chemistry* (Page 40A), state that "cancer is still a who-done-it mystery to which there is not a single basic clue. Because of this we are in the midst of a vast hit or miss program of testing hundreds of thousands of chemical compounds for their possible effects on the various forms of cancer. There is no knowing whether or not this search for a needle in the haystack will yield results and when, but there are many highly qualified scientists who feel that this is the best approach to the problem in the absence of a more positive clue."

Step by Step

On page 19A of the above cited reference is a brief but pertinent editorial forecast entitled "Back to Fundamentals." "Maybe we can't stamp out corrosion as we have polio," the editorial states, "but there's a good start being made in that direction now. *The National Bureau of Standards* is studying the corrosion of copper in pure water with varying amounts of oxygen. Special attention is being given to the films that form on the metal and the part these films play in controlling corrosion. When corrosion in this simple metal-water-oxygen system is understood, industry may then know better how to approach practical and more complicated corrosion problems. One discovery already: The amount of corrosion is seen to depend on the arrangement of the atoms on the metal surface."

In a more detailed report, *J. Kruger*, of the National Bureau of Standards (Page 56A) writes, "These facts obtained from a study of the metal-water system, coupled with a number of other facts from many other fundamental researches, will ultimately aid the engineer when he seeks to solve specific problems of corrosion. This has happened when fundamental electrochemical principles have made cathodic protection feasible or surface chemistry has aided in the devising of organic coating systems.

"Many solutions of corrosion and other problems," the report continues, "have depended on dipping into our store of fundamental knowledge built up over the years. Addition to this store must be made continuously."

Corrosion, Technetium & Hypothesis

Corrosion is a subtle process subject to numerous theories that are difficult to test. In the final analysis, therefore, corrosion prevention is an empirical science. It is the job of paint science to protect metallic substrates by providing a barrier against oxygen and moisture.

Technetium, a rare synthetic element, has recently been shown to be an exceptionally versatile corrosion inhibitor. When I first read about technetium, I was under the impression that its ability to inhibit corrosion was discovered accidentally during investigations into techniques of minimizing radiation damage. However, when I

read, just the other day, a two-year-old article by *G. H. Cartledge* from the May 1958 issue of *Scientific American* (reprinted in a Scientific American book entitled "New Chemistry"), I learned otherwise.

The story of the hypothesis that led to the study of technetium is worth retelling because it illustrates well an important research path—the hypothetical approach.

Chromate compounds comprise one class of commonly used inhibitors for passivating iron. Iron, for example, will remain indefinitely rust free in a solution of potassium chromate.

Cartledge posed the question, "How does the chromate change iron's behavior?" *U. R. Evans and T. P. Hoar, of the University of Cambridge*, made suggestions. Perhaps the chromate helps the iron form an impervious coat. An oxide film with many pores and cracks normally covers iron, they reasoned. Iron atoms which have given up two electrons, thus becoming ferrous ions, pass into solution through these openings. When chromate ions are present, however, they remove a third electron from the emerging ferrous ions, thus converting them to ferric ions. An insoluble oxide is formed when the ferric ions react with water. The pores or cracks are thus plugged and the iron surface is sealed against further reaction.

Herbert H. Uhlig, of M.I.T., argued differently. The electrons are immobilized and the chemical activity of the metal is reduced, he said, because the chromate ions absorbed on a metal surface share electrons with its atoms.

Cartledge found difficulties with both theories. The Evans-Hoar theory, in attributing chromate's anticorrosion effect to its ability to oxidize and precipitate iron ions, seemed to disregard the fact that the inhibiting effect can be nullified by agents which, to our knowledge, change neither the oxidizing nor the precipitating property of the chromate ion.

Uhlig's adsorption theory, Cartledge felt, fails to account for the fact that the sulfate ion, unlike chromate, is not an inhibitor.

The similarity of the external features—size, shape, and charge—of the chromate and sulfate ions was so striking that Cartledge and his group began to investigate their internal characteristics. They searched for an explanation of the difference in their inhibitory property.

Both the chromate and sulfate ions, like all ions of this type, have a tetrahedral structure, with a cage of four oxygen atoms surrounding the central atom—chromium in the chromate, and sulfur in the sulfate.

Cartledge reasoned that the valence electrons between the central atom and the oxygens are distributed differently in the two ions. The electrons in the sulfate ion are shared, he thought, between the sulfur and surrounding oxygen atoms in covalent bonds. The central region of the ion, consequently, is nearly neutral electrically.

But in the chromate ion, no doubt, some of the chromium atom's electrons are detached from it and transferred to the oxygens. The center of the ion, he concluded, should have a high positive charge, by virtue of which a chromate ion adsorbed on a metal or oxide surface might well attract and engulf any free electrons in the surface. This might explain how the chromates inactivate a metal chemically and protect it against corrosion.

Now, he reasoned, if the hypothesis is correct, the amount of central positive charge is the key factor in the corrosion inhibition of an ion of this type. The chromium atom has six electrons to give up in its outermost shell; the maximum possible charge of the chromate ion's interior, then, is six positive units. Any ion with a higher central charge should be an even better corrosion inhibitor than chromate, provided it is a sufficiently weak oxidizing agent to keep its integrity as an ion.

This led straight to an experiment with pertechnetate. Technetium has seven electrons in its outer shells. It forms with oxygen an ion of the chromate type—pertechnetate (TcO_4^-). This ion is a mild oxidizing agent.

The experiment confirmed the theory.

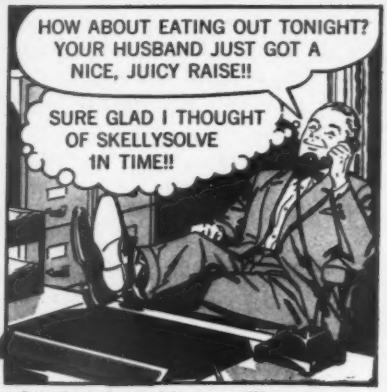
Adhesive Molecules

In this particular case, theory led to an uneconomical method for solving the problem. But this is not always so. We know that orientation of the atoms on the metal surface is also significant so that opportunities lie in creating special alloys, or surface treatments. Such an approach has been clarified by *Dean Taylor, Jr., and John Rutzler, Jr. of Case Institute of Technology* (Chem. Eng. News, June 2, 1958). They have shown that the geometric arrangement of adhesive molecules on metal surfaces has a strong effect on the force between them.

Taylor and Rutzler built scale models of high polymer molecules, placed the models over a scale drawing of the oxygen and metal ions at the surface of a metal, and measured the maximum number of geometrically possible interactions between active sites. The measured number of interactions turned out to be much less than the theoretical number usually used to compute adhesive forces.

This partly explains the difference between the expected and actual strength of an adhesive. Adhesion is often attributed to the van der Waals forces between molecules. Chemists estimate the interaction energy of a single molecule with a single site on the surface of the metal, then integrate over the area of the surface, assuming that all possible sites are taken up by molecules of adhesive. Using molecular models, Taylor and Rutzler showed that in actual practice only a fraction of the active sites is able to take part.

For example, the strength of polyethylene-to-steel bonds is calculated to be about 22,000 p.s.i. But when the strength of the bond is actually measured, the calculated figure is found to be 10 to 22 times too high. Taylor and Rutzler noted that often the difference is blamed on stress concentrations, flaws, or poor preparation of the metal's surface. Rather, they proposed that a very important factor is geometry. One practical benefit from this work may result in a better selection of the most suitable adhesive for a given metal.



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R

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The Production Man. . . .he must be able to efficiently utilize men, machines and materials. To get an idea of his duties and objectives, see page 59.

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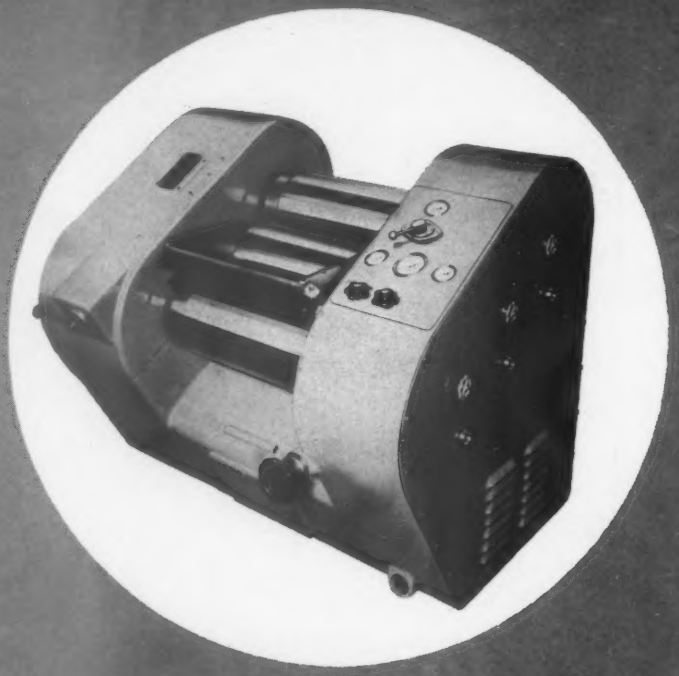

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THE PRODUCTION MAN— *A PROFILE*

By
Lawrence Shatkin

Beginning with this issue, Paint and Varnish Production is proud to present a regular monthly feature by Lawrence Shatkin on the various phases of paint production. Mr. Shatkin's long experience in both the production and managerial aspects of the paint industry assure a full understanding of the industry and its problems.

The primary objective of this feature is not only to further educate the production man in the manufacture of coating materials, but also help him transform company policies into tangible results. Bearing this fact in mind, you can look forward to discussions on the managerial phases of operating a paint plant in so far it concerns production. Specific subjects pertaining to production techniques will also be covered by Mr. Shatkin in this column.

Your comments and criticisms regarding this new feature of Paint and Varnish Production will be most welcomed.

THE EDITOR

WITH the many phases, areas and nuances in today's methods of production, we can easily claim that production has become an art and in numerous ways the production manager must be an artist. This interpretation may not be incongruous in our own industry, since paint, after all, is the basic medium for artists.

Fundamentally, the primary objective of the production manager is to attain greater production through increased efficiency. In order to succeed, he must mix well and be able to utilize most harmoniously, men, machines and materials. This, of course, necessitates a wide technical knowledge concerning the equipment and supplies at his disposal coupled with a mature and experienced view in dealing with human beings.

The latter characteristic cannot be too greatly emphasized. The art of production insists that the supervisor be adept in human relations because his proficiency and success will depend largely on the people he supervises and collaborates with. As in any other executive capacity, a good production manager exercises empathy while encouraging workers to do a better job. He is friendly, fair, firm, at times flexible; is receptive to innovations and is able to properly delegate responsibility.

One of the qualities that a good production manager must have is judicial decision. At times, he acts as the liason man between research and sales. This ability to enter into colleagueship with other departmental personnel is part of the general endowment of good leadership qualities and necessarily sets a good example for the men in his own department.

The administrative functions inherent in the art of production has

An never-ending task—checking product uniformity.

The opinions expressed in this column are strictly those of the author's and do not represent editorial endorsement by this publication.

Planning production schedules

Checking raw material deliveries

Discussing new material with technical salesman

become more apparent in the rising complexities of a growing economy. Above all, his decisions and instructions must be of crystal clarity to avoid misinterpretation. Other requirements essential to his program would include the encouragement and use of suggestions from his workers and an adequate and far-ranging program for the orientation of newly-hired personnel.

The difficulty in obtaining a production management specialist trained in both the science or technical end and the business management phase of operations is apparent to most executives. However, as a matter of company survival, employers should encourage their technical employees to seek training in the arts of management. The dividends accruing from such a defrayed-expense program for a company's employees will be well worth the investment. A developmental program of this type cannot fail to serve as a means for the education and growth of the individuals involved and as a result will improve the effectiveness and efficiency of the organization.

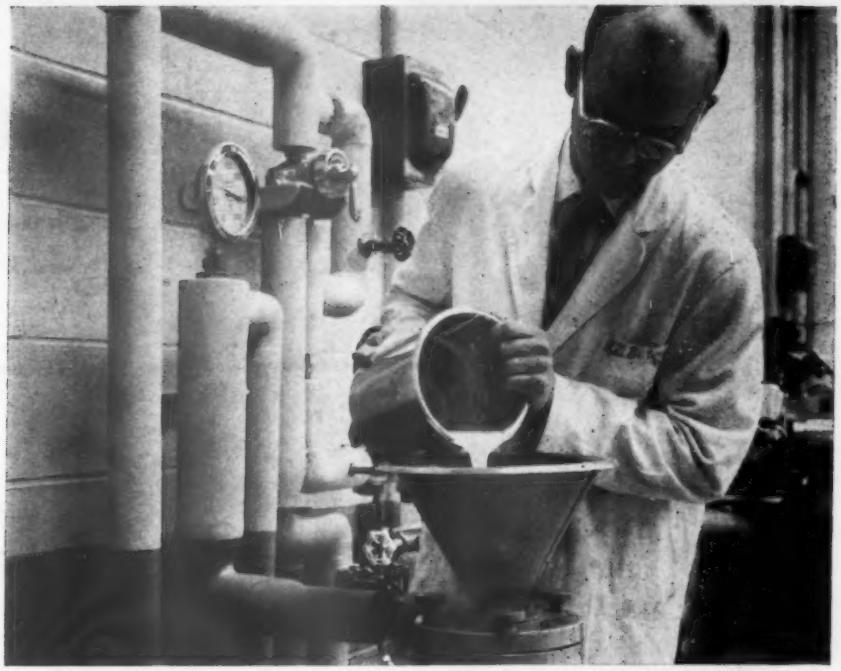
The position of production manager in the company structure varies according to company size and policy. In very small concerns the production manager is invariably the plant manager, chief chemist, technical service man has other titles as well. In medium and larger companies, the production manager occupies a position subordinate to the plant manager or plant superintendant and is apart from the laboratory. He is concerned with efficiency through men and machinery.

In addition to treating the problems of production in their broad perspective, we shall also discuss such specific topics as a suggestion system, the filling operation, productivity analysis, the use of high density media, company objectives, individual objectives and yardsticks, safety, purchasing, statistical quality control, and other factors inherent in the art of production.

John Ruskin once said, "Life without industry is guilt, industry without art is brutality." Without using the harshness of Ruskin's words, we can say that production as an art is not only gentle but returns the greatest dividends in terms of efficiency and increased production.

All photos courtesy of Adelphi Paint & Color Works, Inc.

Manufacturers are already producing paints based on Du Pont's two new PVA emulsions . . .



Here paint specialist John Byrum runs test PVA formulation through Morehouse mill. Improved PVA paint formulations and better production techniques are constantly under investigation at Du Pont's new Sales Technical Laboratory.

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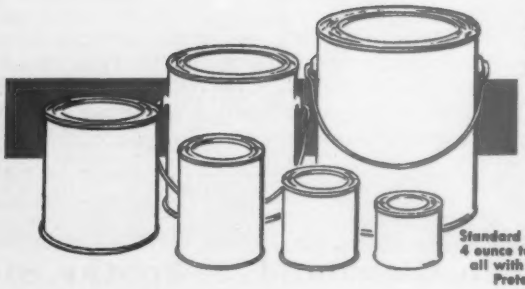

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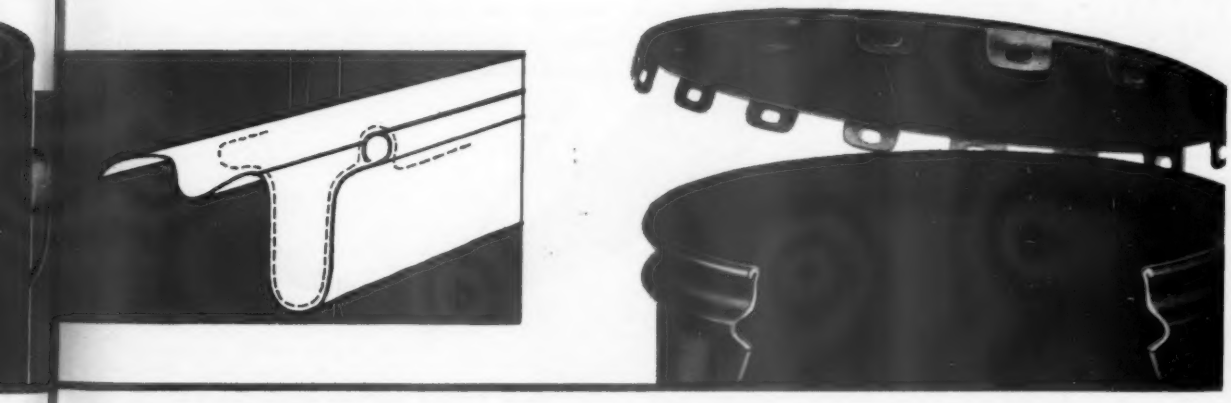

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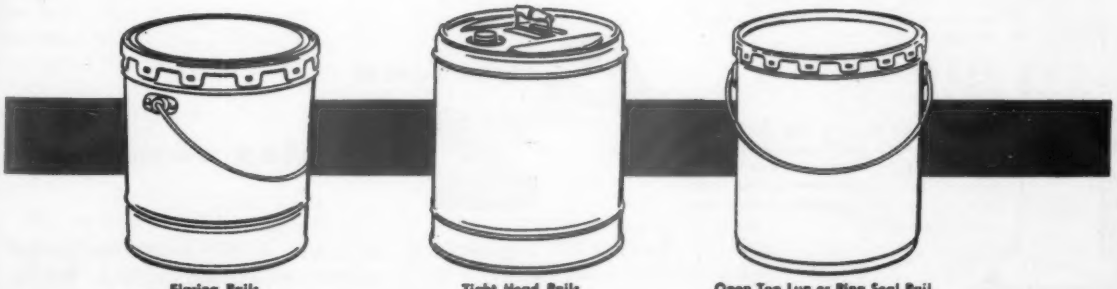

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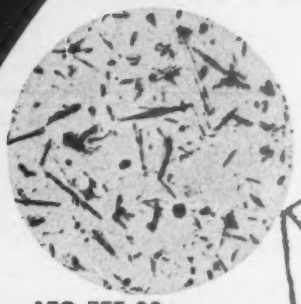
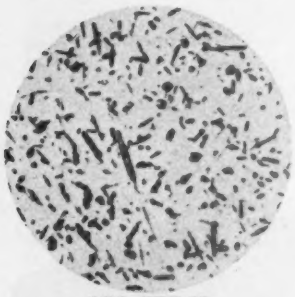
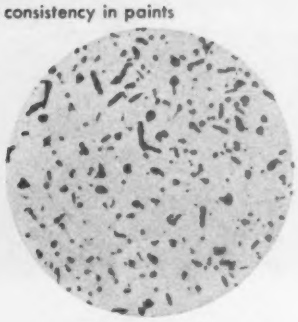


AZO ZZZ-22
for high consistency in paints



AZO ZZZ-11
for medium consistency in paints



AZO ZZZ-33
for low consistency in paints

Whether it's high, medium or low, you'll find there is a particular grade of AZO zinc oxide to meet your needs exactly. And, when necessary, we can select within grades the exact degree of desired oil absorption.

AZO acicular lead-free zinc oxide is a superior pigment that will give extra durability, finer weathering qualities to your paints.

ALL AZO PAINT GRADE ZINC OXIDES AVAILABLE AS AZODOX (De-Aerated)

AZODOX has twice the apparent density, half the dry bulk. Faster handling, easier storing, quicker mixing. Costs no more.

AZO acicular zinc oxides are free from detrimental colloidal fines, produce exceptional weathering properties in exterior paints, and are resistant to hard settling during shelf storage. For general use in the production of paints and enamels.

1ST

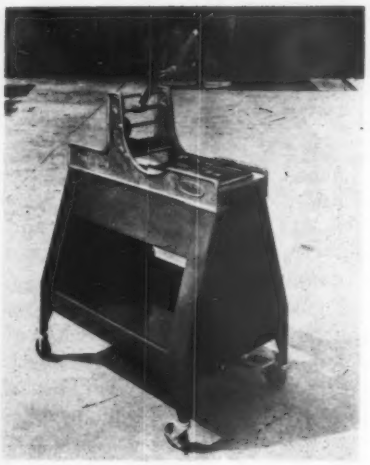
American Zinc was the first, *and is still the only* producer of acicular lead-free zinc oxides covering a wide range of oil absorptions from high to low *and including the intermediate ranges.*

American Zinc sales company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



BENNETT

PORTABLE PRINTER
500 Pails Per Hour

Quality printing on five-gallon pails claimed to be possible at extremely low cost with a new portable printing device.

Called the Chapco Print-A-Can Printer, the machine will handle up to 500 pails per hour.

Will handle all types of five-gallon pails—open or closed head, with or without rolling hoop. Weighs 160 pounds.

Operation is mechanical, requiring no electric or air power. Printing area is 9″ x 14″. Type as small as ten point may be reproduced satisfactorily. Each plate said to be good for many thousands of impressions.

Ink available in most colors. Dries to touch when applied. Two colors may be applied simultaneously.

Accessory available for printing 30 and 55-gallon drums.

Bennett Industries, Inc., Dept. PVP, Peotone, Ill.

LAB CENTRIFUGE
Automatic Rotor Balancing

Automatic centrifuge, type SS-3, gives large-capacity, superspeed performance.

Has gyro-action self-centering drive which permits automatic rotor balancing to a degree said to be unequaled in the superspeed ranges.

Acceleration and braking are automatically controlled. Operating intervals established by a synchronous, motor-driven timer.

When centrifugal forces of more than 34,000 x G are required, there is the SS-34 rotor, having eight numbered compartments for 50 ml tubes, and capable of speeds in excess of 17,000 rpm.

SORVALL

The SS-34 rotor may be adapted for the "Szent-Gyorgyi & Blum" 8-tube continuous flow system.

Ivan Sorvall, Inc., Dept. PVP, Norwalk, Conn.

ANTIFOAMS
Fast-Acting

"Sag" antifoams, fast-acting and highly effective foam killers for industrial use have been placed on the market.

New products come in two forms—"Sag" 47 silicone antifoam fluid for non-aqueous systems and "Sag" 470 silicone antifoam emulsion for aqueous foaming systems.

"Sag" 47 is a 100% solids solution which can be used at full strength, or as a solvent solution, or blended with other materials.

"Sag" 470 contains 10% silicone solids by weight, and is ready for use, but can be further diluted if desired.

These antifoams are chemically inert and resist oxidation over long periods. Their toxicity is said to be extremely low.

Silicones Division, Union Carbide Corp., Dept. PVP, 30 E. 42nd St., New York 17, N.Y.

BELT CONVEYOR SCALE
Fixed or Variable Speed Conveyor

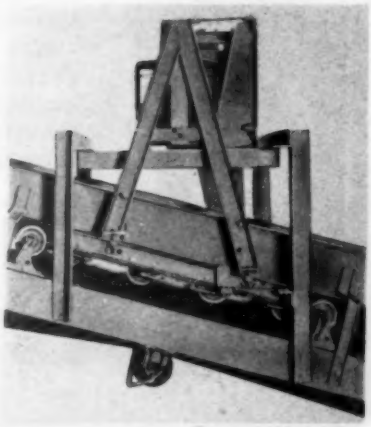
Unitized, pneumatic, belt conveyor scale which is easily installed on existing flat-belt or trough-type conveyors with a minimum of downtime and only slight modification to the conveyor. Unit can be adapted to either fixed or variable speed conveyors.

The W-C belt conveyor scale is available in a variety of sizes to handle a large range of capacites.

Scale employs a flexural frame arrangement and uses no knife edges, pivots, or bearings.

Weight & Control Compenents, Inc., Dept. PVP, 802 Lincoln Rd., Hatboro, Pa.

WEIGHT & CONTROL



NEW MATERIALS — EQUIPMENT

ACRYLIC SOLUTION
Good Adhesion & Hardness

Acrylic polymer solution, Acryloid B-44, now available in commercial quantities as a 40% solution in toluol.

Acryloid resin said to be particularly noteworthy for the hardness and adhesion of its films. Fast solvent release and excellent pigment dispersion claimed to permit the formulation of Acryloid B-44 in coatings with as high as 45/55 pigment-to-binder ratio, yet with the retention of good gloss.

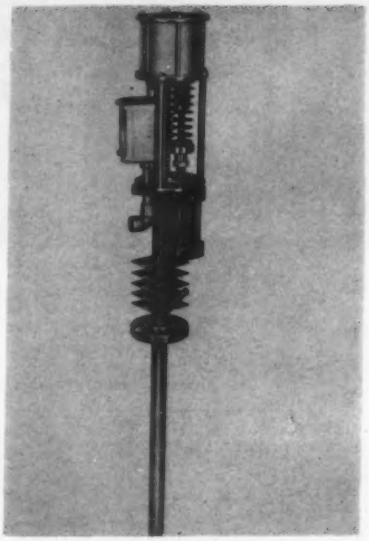
Water-white color, resistance to discoloration on aging, outstanding flexibility of the film, and excellent durability of this solution are typical of the acrylic coatings system.

Rohm & Haas Co., Dept. PVP, Washington Square, Philadelphia 5, Pa.

MEASURING ELEMENTS
For High-Pressure Reactors

New measuring elements use a proximity switch for timing the fall of a piston through the liquid in the process.

Piston is intermittently raised by a mechanical lifting mechanism and then allowed to fall by gravity.



NORCROSS

A recorder controls the frequency of lifting, receives the time signals from the measuring element and converts the time of fall data into a complete viscosity record.

Measuring elements are applicable for measuring viscosities from .1 to 1,000,000 cp. and are use with the company,s recorders.

Norcross Corp., Dept. #N47, Newton 58, Mass.

BURETTE
Up To 350°F.

New burette, called Thermette, developed to measure and deliver small quantities of heated liquids. The heating system of the burette can maintain up to 350°F.

Burette enclosed in a glass cylinder. Furnished for surface mounting by means of flanges at the top and bottom.

Special pyrex tube is graduated in ml. and heating is by means of a transparent conductive coating on the outer surface of the glass.

Burette terminates in a ¼" glass pipe tubulation fitted with a standard ¼" pipe flange. This flange can be furnished with adapters to any type of glass, metal, plastic tubing, or piping.

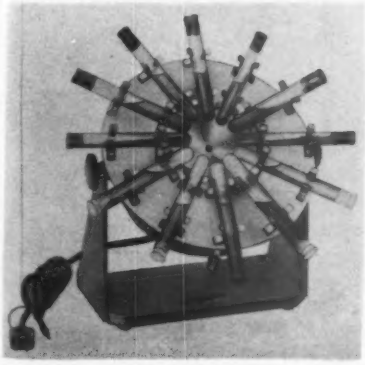
Two sizes available with capacitites of 340 or 820 ml. Reading is facilitated by a fluorescent light extending the full length.

Pressure Products Industries, Inc., c/o Charles D. Karlsruher Dept. PVP, 1707 Melrose Ave., Havertown, Pa.

NEW MATERIALS — EQUIPMENT

LABORATORY AGITATOR
Four Rotating Speeds

Newly designed rotary liquid agitation laboratory apparatus now avilable.



NEW BRUNSWICK

Operating electrically, Model ST Spinnerette eliminates need for manual shaking of test tubes or small vessels. Combines versatility of four rotating speeds with the advantage of a changing tilt angle of platform to provide optimum variation in rate of mixing or agitation.

Consists of a stainless steel oval enclosure in which are housed a synchronous motor and mechanical speed control mechanism. Mounted to motor assembly is an 11″ diameter aluminum platform which may be tilted from a vertical to horizontal position.

Rotating speeds of approximately 15, 30, 45, or 80 cycles per minute can be achieved.

Weighs 24 pounds. Dimensions are 12-3/8″ wide by 6″ deep by 13-7/8″ high.

New Brunswick Scientific Co., Dept. PVP, P.O. Box 606, New Brunswick, N.J.

SOLID EPOXY RESINS
High Purity

Three new solid epoxy resins have been developed.

Designated D.E.R. 661, 664, and 667, the resins will be used in coating for appliances, auto body primers, cans, drums, tank cars, and for industrial maintenance.

Superior purity is claimed, a characteristic which will enable processors to use the dissolved resin without filtering.

Resins have a color rating of one maximum, meaning extreme clarity.

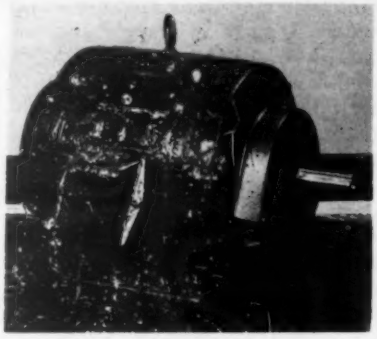
Have lowest sodium content of any epoxy resins available, according to the firm, giving them better electrical and coating performance. Also, the resins have a narrow specification range.

D.E.R. 661 is a low molecular weight resin for catalytically cured coatings, and can be cured at room or slightly elevated temperatures. D.E.R. 664 is useful in ester type one-component systems needing no curing agent, while 667 is catalytically cured, requiring high baking temperatures, and gives maximum flexibility and toughness.

Dow Chemical Co. Dept. PVP, Midland, Mich.

A-C. MOTOR
Weatherproof

Weatherproof a-c. motor for use in "outdoor" type applications where motor is subject to extreme moisture or the elements.



RELIANCE

N E W
MATERIALS — EQUIPMENT

Available in all standard speeds in sizes from one through 250 horsepower.

Open motor said to exceed NEMA splash-proof requirements. External parts of corrosion proof cast iron. Insulation system is completely non-hygroscopic. It features silicone sleeving, glass-mica slot liners, and glass mat top-sticks and mid-sticks.

Rotor O.D. and stator I.D. are coated with a rust inhibitor. Water-tight conduit box is cast iron with a gasketed cover and threaded outlet.

Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

POWER STACKER

For 2000 Lb. Loads

New 24-volt Walkie Stacker, for 2000 lb. palletized loads.

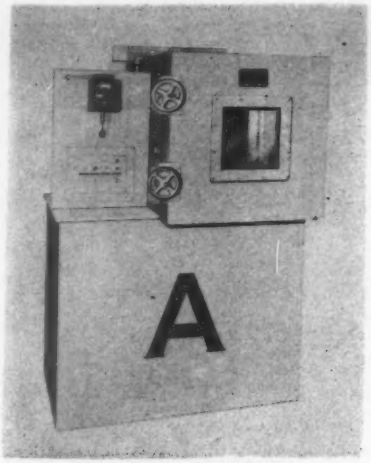
Model handles loads up to 48″ x 48″ and will stack them more than ten feet high. Power unit is of compact design. Four six-volt batteries mounted in pairs on each side of the drive unit.

Walkie Stacker will enter pallets at right-angles in aisles as narrow at 53″.

All controls for travel speed and direction, elevating and lowering, are clustered on the steering handle control head.

Available with elevated heights of 52″ to 124″.

Raymond Corp. Dept. PVP, 345-169 Madison Ave., Greene, N.Y.



ASSOCIATED TESTING

TEMPERATURE TEST CHAMBER

Cascade Refrigeration

New environmental test chamber for low-high temperature testing in the range of −100°F. to +800°F.

High efficiency of the Freon 13 - Freon 22 cascade type unit said to be seen by the high heat dissipation. Accuracy to within plus or minus 2°F.

Aircooled compressors said to assure ease of operation and blower motors are externally mounted for accesibility.

Working dimensions are 18″ x 18″ x 18″ (internal volume 3.4 cubic feet).

Associated Testing Laboratories, Inc., Dept. PVP, 112 Clinton Rd., Caldwell, N.J.

ELECTRIC TIERING TRUCK

24-Volt Rider-Type

Rider-type narrow-aisle electric tiering truck incorporating a 24-volt electrical system.

Designated as the L-S 24-volt Model "MN" truck. Travelling speeds of 4.5 m.p.h. empty, up to 4.2 m.p.h. loaded. Lifting speeds as much as 50 f.p.m. empty, 42 f.p.m. loaded.

Truck is a straddle-type vehicle with standard forks. Offered in capacities of 2000 or 3000 pounds.

Four speeds in both forward and reverse directions, as well as three separate braking systems.

Lewis-Shepard Products, Inc., Dept. R8-17, Dept. PVP, 125 Walnut St., Watertown 72, Mass.

NEW MATERIALS — EQUIPMENT

PAINT LATEX

Non-Foaming

A new paint latex, claimed to exhibit remarkable resistance to foaming and excellent water resistance, has been introduced by the plastics division of Koppers Co., Inc.

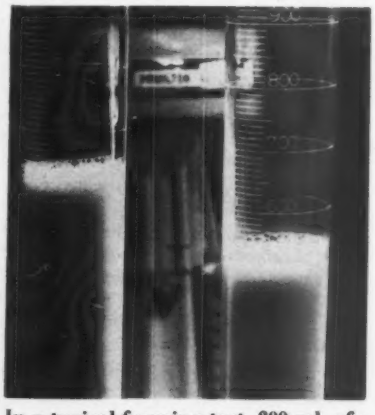
Known as Dylex Latex K-31, the new formulation is a stable water dispersion of a styrene-butadiene copolymer fortified during polymerization.

Dylex Latex K-31 is characterized by an extremely uniform particle size, resulting in films of superior packing density. A typical photomicrography shows the particle size to be 0.200 microns with a variation of only plus or minus 0.003 microns.

Tests show that Dylex Latex K-31 may be used alone or in combination with other film formers including long oil alkyds, proteinaceous or cellulosic water soluble resins, or in combination with conventional, stable, styrene-butadiene latices.

K-31 said to produce water base paints with improved scrubbability and stain removal, and excellent storage and freeze-thaw stability.

Paints prepared with the new latex may contain typical water dispersable pigments and low cost extenders.



In a typical foaming test, 200 ml. of a competitive latex and 200 ml. of Dylex Latex K-31 were agitated by mechanical means. The results of foaming are shown, above, with competitive latex A at approximately 600 ml. vs. Dylex K-31 at 450 ml. Foam persistence was also significantly less for the Dylex K-31 than for competitive latex A.

PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

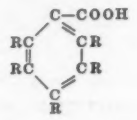
Wax-Silicone-Resin Polish

U. S. Patent 2,839,482. Henry C. Geen, Grand Rapids, Mich., and James D. Quist, deceased, late of Holland, Mich., by Hazel M. Quist, executrix, Holland, Mich., assignors, by mesne assignments, of one-half to S. C. Johnson & Son, Inc., a corporation of Wisconsin, and one-half to Simoniz Co., a corporation of Delaware.

A polishing composition adapted to be applied to a surface to give a glossy protective coating thereto, comprising: about 3-5 parts by weight of a liquid, substantially non-volatile, linear polydialkylsiloxane having a viscosity of about 50 to 100,000 centistokes at 25°C. to improve ease of spreading and polishing; a wax, the siloxane and wax being in such proportions as to avoid substantial haziness in said coating; a major proportion of a liquid, volatile organic solvent; and about 1-3 parts by weight of a thermoplastic, substantially non-crosslinked resin, substantially non-volatile at ordinary room temperatures, compatible with the wax, at least miscible with the solvent, and substantially incompatible with the siloxane, the resin being present in sufficient proportions to improve the gloss but in an amount less than that imparting substantial stickiness to said coating, and the solvent being present in sufficient quantity to function as a mutual solvent-dispersant for the siloxane, the wax, and the resin.

Vinyl Mixture

U. S. Patent 2,837,490. Arthur C. Hecker, Richmond Hill, N. Y., assignor to Argus Chemical Laboratory, Inc., a corporation of N. Y.



A composition of matter comprising asbestos containing iron oxide, a resin component selected from the group consisting of vinyl chloride resins and vinylidene chloride resins, and a stabilizer therefor, the proportion of the asbestos being 25-200 parts by weight for 100 of the polyvinyl chloride resin and the stabilizer consisting essentially of the iron oxide of the asbestos in contact with a free acid of the type formula in which R represents a component selected from the group consisting of hydrogen, C_1-C_5 alkyls, hydroxyl, halogens, oxyacyl, oxyalkyl, ester, nitro and phenylene groups and at least 2 of the R's represent components selected from the group consisting of hydrogen and C_1-C_5 alkyls.

Coating Composition

U. S. Patent 2,840,478. George Otto Orth, Jr., and John Spinelli, Seattle, Wash., assignors to American Potash & Chemical Corp., a corporation of Delaware.

A protective coating composition, having good surface adherence characteristics and being resistant to elevated temperatures, comprising in substantially homogeneous admixture, an organic film-forming material, an inorganic coloring material in finely divided form, and from 5% to 15% on the weight of the composition on a wet basis of an inorganic frit consisting of the finely divided production of the fusion at about 370°C. of from about 20 to 50 parts of boric oxide, from about 25 to 60 parts of lead oxide, and from about 1 to about 20 parts of sodium fluoride.

Styrenated Oils

U. S. Patent 2,837,546. Joseph Nichols, Princeton, N. J., assignors to Ethicon, Inc., a corporation of New Jersey.

A styrenated oil in which the oil is

a glyceride selected from the class consisting of glycerides of 12-keto-oleic acid, glycerides of 12-keto-10-octadecenoic acid, and mixtures thereof.

A bodied, styrenated oil in which the oil comprises a glyceride selected from the class consisting of glycerides of 12-keto-oleic acid, glycerides of 12-keto-10-octadecenoic acid, and mixtures thereof.

Non-Solvent Anti-Corrosive Shipbottom Composition

U. S. Patent 2,838,419. William J. Francis, Portsmouth, Va.

A method of painting steel structures that are to be exposed under water for long periods of time, comprising applying directly to the steel of the structure an anti-corrosive substrate coating in a molten state, the coating composition being solid at ambient temperatures, but molten in a temperature range of about 250°-300°F. and above, said coating having a formulation substantially as follows:

	Percent range
(*a*) A substance from the class consisting of rosin, ester gum and hard para-coumaroneindene resin	25.–32.5
(*b*) Paraffin (melting point 125–127°F.)	11.8–16.2
(*c*) Microcrystalline Wax	2.8–9.4
(*d*) A substance from the class consisting of ethyl cellulose and polyvinyl buty ralresin	1.6–1.9
(*e*) A substance from the class consisting of zinc naphthenate, hydrogenated methyl abietate, soft para-coumarone indene resin (melting range 86°–104°F.)	1.35-5.
(*f*) A substance from the class consisting of calcium chromate, stontium chromate, and barium chromate	10.–25.
(*g*) A substance from the class consisting of magnesium silicate, alumina, silica, barium sulphate, calcium sulphate phate and mica	0.–15.
(*h*) Rosin	25.–32.5
(*i*) Zinc naphthenate	1.35–5.

and subsequently applying an anti-fouling coating.

Stabilized Varnishes

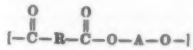
U. S. Patent 2,838,412. Raymond E. Werner and Theodore A. Langstroth, Cincinnati, Ohio, assignors to Sterling Drug Inc., New York, N. Y., a corporation of Delaware.

A composition containing a varnish and a nitrophenylazo pigment and including: benzotriazole, whereby the composition is stabilized against discoloration by contact with iron in the presence of small amounts of water.

Polyesters From Dicyclohexyladipic Acid

U.S.Patent 2,844,560. Harry Greenberg and Raymond W. Horst, Cincinnati, Ohio, assignors to Natl. Distillers and Chem. Corp., New York, N. Y., a corporation of Virginia.

A polyester containing units of the following structure



wherein A is the hydrocarbon portion of a glycol and R is the hydrocarbon portion of a dicarboxylic acid, and further characterized by containing a unit of the foregoing structure in which R is the hydrocarbon portion of *a,a'* -dicyclohexyladipic acid.

Composition For Detecting Moisture Leakage

U.S.Patent 2,845,394. Claude S. Thompson, Elizabeth, N. J.

A composition for application as a permanent coating to the exterior surface of a container for water at elevated temperatures and through which surface said water may leak, which when applied as a coating and dried will be resistant to high atmospheric humidity and temperatures to which it may be exposed, and which when so applied will clearly indicate the existence and location of any such leak that may subsequently develop, which comprises a coating mixture containing a first powdered material of lead chloride which

is substantially insoluble and chemically stable in water at approximately usual room temperatures and below, but substantially soluble and chemically stable in water at temperatures well above the usual room temperatures, a second powdered material selected from the group consisting of manganese dioxide, ferric oxide, and graphite having a color substantially contrasting with that of said first powdered material, insoluble in water at all temperatures, and chemically stable at temperatures within the range to which said surface may be subjected, and a gel-like binder containing a compound of silicon in an aqueous carrier medium which binder is chemically stable and substantially unaffected by high atmospheric humidity and temperatures from below room temperatures to temperatures above those to which the coating may be exposed in use, whereby when a leak of water at elevated temperatures occurs in said surface covered by said coating, said first powdered material at the leak will be dissolved by the escaping water and carried to the surface of the coating where the escaping water carrier will evaporate and leave a deposit of said first powdered material on the surface of the coating where its color contrasting with that of the coating will indicate the existence and location of a leak in said container.

Enhancing Pot Life of Polymerizable Coatings

U. S. Patent 2,843,556. Robert W. Moorman, Springdale, Pa., assignor to Pittsburgh Plate Glass Company, Allegheny County, Pa., a corporation of Pennsylvania.

A resinous composition comprising a mixture of (A) a polyester of a dihydric alcohol and an alpha-beta ethylenically unsaturated dicarboxylic dicarboxylic acid, (B) a monomer containing a $CH_2=C<$ group, the monomer being present in an amount of about 5 percent to 50 percent by weight based upon the polyester-monomer mixture, and (C) about 0.5 percent to 12 percent by weight of water based upon the total weight of said interpolymerizable components.

Compositions Comprising Acrylonitrile Polymers

U.S.Patent 2,843,558. Yoshisato Fujisaki, Kochi-shi, Kochi-ken, and Hidehiko Kobayashi, Fukuokason, Enagun, Gifu-ken, Japan, assignors to Asahi Kasei Kogyo Kabushiki Kaisha, Kita-ku, Osaka, Japan, a corporation of Japan.

A new composition of matter comprising a polymer of acrylonitrile containing in the polymer molecule at least 85% by weight of acrylonitrile and a compound taken from the class consisting of benzoyl dimethylamide and phthaloyl tetramethyldiamide.

Postage
will be paid by
Addressee

No postage
stamp necessary
if mailed in the
United States

BUSINESS REPLY ENVELOPE
First Class Permit No. 2261 Chicago, Ill.

INLAND STEEL CONTAINER COMPANY
Customer Service Department
6532 South Menard Avenue
Chicago 38, Illinois

CUT PACKAGING COSTS with INLAND'S INTEGRATED STEEL PACKAGING SERVICE!

The checklist presented below includes important areas in the average packaging operation which should be reviewed to determine whether you are obtaining the most for your packaging dollar.

Check your own operation against this list. You may find that a more economical container can be used for a particular product or that you can effect savings by analyzing your ordering procedure.

If you want additional information on any of the areas listed, check the proper classification and return this form to us. Your Inland representative will contact you to put Inland's Integrated Steel Packaging Service to work.

Show me how I can reduce costs by analyzing my complete packaging operation. I am specifically concerned with the areas checked below:

1. BASIC CONTAINER CONSTRUCTION

Selecting the right container for the product to be shipped.

- ☐ type of steel (carbon, stainless steel, galvanized)
- ☐ capacity (drum or pail of proper size)
- ☐ most efficient closures (e.g., covers, gaskets, spouts, plugs and flanges)
- ☐ special basic container requirements (e.g., location and number of beads or rolling hoops)
- ☐ other (indicate)_____

2. CONTAINER INTERIOR LININGS

Finding correct linings to overcome problems of shipping specific products.

(indicate product/s)_____

(indicate requirements)

- ☐ maintaining product quality
- ☐ maintaining product color
- ☐ other_____

3. EXTERIOR DECORATION OF CONTAINERS

Planning for the most effective exterior finish and design of container to fit marketing situation.

- ☐ deciding upon most effective exterior design (e.g., for advertising product brand, for building family identification of products, for product use instructions)
- ☐ determining most efficient method of finishing exterior of container (e.g., lithography, silk screening, rubber plate printing, painting, striping)
- ☐ other_____

4. PROCUREMENT AND HANDLING OF STEEL CONTAINERS

Increasing efficiency of ordering, storing and in-plant handling of containers.

- ☐ how to order most economically
- ☐ warehousing containers
- ☐ stacking and palletizing
- ☐ outdoor storage
- ☐ U.S. Government packaging specifications
- ☐ other_____

5. PACKAGING & SHIPPING PRODUCTS IN STEEL CONTAINERS

Planning for most efficient packaging and shipping procedures

- ☐ improving filling operations
- ☐ increasing efficiency of closing operations and equipment
- ☐ information on ICC and other applicable specifications for the shipment of specific products in steel containers

other _____

Name_____

Title_____

Company_____

Address_____

City_____ State_____

INLAND STEEL CONTAINER COMPANY

6532 South Menard Avenue, Chicago 38, Illinois

Member of the INLAND Steel Family

Plants: Chicago • Jersey City • New Orleans • Cleveland & Greenville, Ohio

Full line of steel and stainless steel shipping containers, including galvanized and heavy duty ICC drums.

TECHNICAL Bulletins

VINYL STEARATE

An 18-page bulletin on vinyl stearate has been issued by Air Reduction Chemical Co., Dept. PVP, 150 E. 42nd St., New York 17, N.Y.

Outlined are the physical properties, solubility, solvency for gums and resins, handling and storage, and chemical properties of vinyl stearate.

Sections are devoted to discussions of polymerization, homopolymerization, copolymerization, vinyl stearate as a synthetic intermediate, applications, and toxicity.

A listing of 46 references is also included.

LATEX PAINT

Latex paint—what it is, what it can do, how it's used—is the subject of a 16-page booklet published by the Dow Chemical Co., Dept. PVP, Midland, Mich.

Entitled, "Why and Where to Specify Latex Paint," the booklet gives the history of latex paint, the standards necessary for quality latex paint, and what the user can expect from it.

A glossary of terms is also included.

POLYGLYCOL

A revised edition of the booklet, "Choosing the Right Polyglycol" has been made available by the Technical Service & Development Dept., The Dow Chemical Co., Dept. PVP, Midland, Mich.

Described in this booklet are polyethylene glycols, polypropylene glycols, polybutylene glycols, polyepichlorohydrins, polystyrene glycols and miscellaneous polyglycols, including five new trihydroxy polypropylene glycols.

The 24-page booklet outlines the properties, availability, and uses of the various polyglycols.

C/R PASTE DISPERSIONS

A product information sheet outlining chlorinated rubber (C/R) paste dispersions has been published by Pennsylvania Color & Chemical Co., Dept. PVP, Pine Run Road, Doylestown, Pa.

The sheet describes the firm's line of C/R paste dispersions for industrial coatings, paint, and printing inks. The literature amplifies the basic published information on this type of pigment dispersion.

The bulletin includes data on general characteristics, applications, advantages—together with complete specifications, weights, and prices on 15 different dispersions.

FLOOR TRUCKS

A circular to aid in the selection of four-wheel floor trucks for a wide variety of special and standard materials handling jobs has been made available by Lewis-Shepard Products, Inc., Dept. PVP, 125 Walnut St., Watertown 72, Mass.

Designated as circular 29-D, the six-page presentation describes and pictures some 52 different floor trucks manufactured by the firm.

Included are trucks with replaceable wooden decks, roller platforms, V-type decks, removable end and side racks, spring-loaded decks, and steel shelving.

Various applications for each of the floor trucks are described in detail.

PROTECTIVE COATINGS

"Research to Improve and Ex-

pand the Use of Southern Farm Products in Protective Coatings" has been made available by the Southern Utilization Research & Development Division, Dept. PVP, P.O. Box 7307, New Orleans 19, La.

Importance of southern farm products in protective coatings, and research to expand the use of these products in such coatings, are outlined in this report.

Products discussed include vegetable oils such as tung oil and castor oil; naval stores, including rosin and turpentine; rice wax; sucrose and sugarcane products such as aconitic acid; miscellaneous products derived from naval stores; glyceride oils, and jojoba oil, a liquid wax derived from the jojoba nut.

IMPROVING BUSINESS

An eight-page booklet containing charts, checklists, and other useful management information has been made available by the E. Norman Kagan Co., Dept PVP, Empire State Bldg., New York 1, N.Y.

Entitled "Improving Business," the pamphlet discusses such factors as optimum yearly sales per employee, productivity per square foot for different industries, and how sales volume affects sales dollar breakdown.

Other subjects include a "danger signals" checklist, itemizing early signs of backsliding, and a table of average turnover rates for various industries.

A list of the management consulting firm's services is also given.

FLOOR FINISHES

Revised specifications covering finishes for floors of nothern hard maple have been made available by the Maple Flooring Manufacturers Assn., Dept. PVP, 35 East Wacker Drive, Chicago 1, Ill.

The new specifications became official on September 1, and supersedes those published in 1955. They establish standards for finishes for both heavy duty and gymnasium floors and are designed to give users of these products the benefit of new developments and improvements since the last specifications were issued.

METHYL BUTYNOL & PENTYNOL

A 60-page bulletin on methyl butynol and methyl pentynol has been issued by the Air Reduction Chemical Co., Dept. PVP, 150 East 42nd St., New York 17, N.Y.

The main topics, covered in detail, include physical properties, storage and handling, toxicity, methods of analysis, chemical properties, and applications.

The chemical properties section covers reactions of the hydroxyl group, of the triple bond, of acetylenic hydrogen, and of the hydroxyl group and triple bond.

A 30-page applications section describes the major uses for methyl butynol and methyl pentynol, especially detailing their uses as solvents for various resins.

PINE OIL REPLACEMENT

A 2-page information sheet describing PX-1, a new pine oil replacement, has been made available by Hodag Chemical Corp., Dept. PVP, 7247 N. Central Park, Chicago 45, Ill.

The information sheet describes

the product, its applications, and physical properties. Examples of typical product formulations using PX-1 are included.

V*S DRIVES

A 16-page, full-color booklet, which thoroughly describes the firm's V*S drives, has been made available by the Reliance Electric & Engineering Co., Dept. PVP, 24701 Euclid Avenue, Cleveland 17, Ohio.

The booklet, designated Bulletin D-2506, illustrates in copy, photographs, and diagrams how V*S drives operate and may be applied to various types of machinery in all industries.

The manufacture and functions of the drive compenents, including regulators, exciters, motor-generator sets, operator's panels, and super "T" motors are graphically covered.

The bulletin also lists condensed drive specifications, dimensions, and accesories.

ELECTRIC FORK TRUCK

A four-page bulletin providing complete operating and design specifications on the Model F-45T3, 3,000 lb. capacity electric-powered fork truck has been published by the Elwell-Parker Electric Co., Dept. PVP, 4205 St. Clair Avenue, Cleveland 3, Ohio.

The brochure contains detailed truck specifications along with basic truck dimensions and turning diagrams.

Operating pictures and basic details about the design features of the Model F-45T3 are also included.

COLORIMETER

A two-page bulletin featuring the new Precision ASTM Colorimeter, which fully complies with the important new ASTM D1500 specifications for measuring color of petroleum products, has been made available by Precision Scientific Co., Dept. PVP, 3737 West Cortland, Chicago Ill.

The bulleting fully describes where and how to apply the new Colorimeter and outlines the advantages it provides the user.

SURFACE AGENT

A bulletin on Sarkosyl surface active agents has been issued by Geigy Industrial Chemicals, Dept. PVP, Saw Mill River Road, Ardsley, New York.

The brochure discusses properties and applications for the product.

DRIER CATALYST

A booklet describing and illustrating how Zirco, a drier catalyst, permits the paint formulator to break a 100 year precedent and to replace lead completely has been made available by Zirco, Advance Solvents & Chemical, Dept. PVP, 500 Jersey Avenue, New Brunswick, New Jersey.

The booklet shows how Zirco is applied in the protective coatings industry, gives formulations and examples of how Zirco is used.

A two-page chart explains advantages and functions.

SPRAY EQUIPMENT

A giant size folder shows the new complete Eclipse line covering all phases of spray equipment.

The booklet reviews and introduces many newly developed products of the firm.

This 50th anniversary folder has been made available by the Eclipse Air Brush Co., Dept. PVP, 390 Park Avenue, Newark 7, N.J.

New Books

Physical Chemistry of High Polymers

By Maurice L. Huggins, Research Associate, Eastman Kodak Co. Published by John Wiley & Sons, Inc., 440 4th Avenue., New York 16, N.Y. Price $6.50.

This 175-page publication is designed to be used by chemists and physicists working with synthetic polymers, textile fibers, rubber, proteins, and plastics.

Dr. Huggins extends the concept of classical physical chemistry to systems containing large molecules and describes, in detail, the molecular structure of both synthetic and natural high polymers, including proteins. He emphasizes fundamental concepts and principles, and an understanding of the relationships between structures and properties.

Recent work in high polymer research is fully described. Dr. Huggins presents his own previously unpublished theory of the dependence of the thermodynamic properties of polymer solutions on the sizes, shapes, and structures of the component molecules. The important role of hydrogen bonding in determining polymer structure and properties is also discussed, with many illustrative examples given.

This book can be used as a guide by the researcher who is looking for new types of polymers, or for a procedure to modify properties of a polymer of a given type.

The Effects of Nuclear Radiation on Military Specification Paints

By L.A. Horrocks, Wright Air Development Center, U.S. Air Force. Published by the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C. Price $1.00.

Silicone-alkyd, alkyd, and phenolic resin-based paints possess satisfactory resistance to high dosages of gamma radiation according to this 29-page report, designated PB 131599.

Other paints evaluated for the effects of radiation and heat were nitrocellulose, fluorocarbon, and epoxy resin-based.

The screening consisted of irradiation by gamma raidation followed by high-temperature exposure. Results of test run for adhesion, reflectance, abrasion resistance, and humidity resistance are outlined.

Paint, Varnish, Lacquer, and Related Products—Compilation of Standards D-1

Published by the American Society for Testing Materials, 1916 *Race St., Philadelphia* 3, *Pa. Price* $8.25.

This 900-page publication has been compiled to collect all of the ASTM specifications, methods of test, and definitions pertaining to paint, varnish, lacquer, and related products. It supersedes the January 1955 edition.

Two hundred standards are contained, of which 27 are new, revised, or have had their status recently changed. Among these are standards for pigments, drying oils, paint driers, thinners, shellac, varnish, lacquer, traffic paint, bituminous emulsions, printing inks, putty, glazing and caulking compounds, weathering test, naval stores, cellulose and derivatives, and miscellaneous specifications.

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PRODUCTION TIP

DISPERSING PIGMENTS WITH BALL and PEBBLE MILLS

PEBBLE mills and steel ball mills are found in almost every paint laboratory and every paint plant. These mills are popular because of their versatility and the relatively low cost of operation.

The average paint laboratory has a number of adaptations of these mills ranging from the gallon porcelain jar containing ½"-¾" flint pebbles to an 8 oz. jar containing 1/8" steel balls.

The successful operation of pebble mill equipment is dependent on the speed of the mill; the type, size and quantity of grinding media; quantity of material in the charge and the viscosity of the charge.

Experience has shown that the best operating speed is approximately 55% of the critical speed. The critical speed is that speed at which the centrifugal force is just equal to the gravitational force. In other words, it is the speed at which the pebbles, without the grinding charge, are held to the periphery of the mill by centrifugal force. The critical speed for a given-size mill is found by dividing 54.19 by the square root of the radius of the mill expressed in feet. The critical speed of a mill having a diameter of 2 feet is 54.19 r.p.m., while a jar with a diameter of 4.5 inches has a critical speed of 125 r.p.m. The angle at which the outer layer of balls or pebbles falls from the periphery is controlled by the operating speed. The angle should be about 45°. The pattern prod-

Ball mill fully charged is placed on roller. Grinding time may vary from overnight to 60 hrs. until pigment particles are completely wetted down.

This article is based on a study by the Pigment Division of the American Cyanamid Co., Bound Brook, N. J.

uced in the mill would consist of the outer layer of balls and part of the underlying layer moving in a downward path, cascading, tumbling, rolling and sliding to produce a grinding action as the bottom layer of the media in the mill moves upward.

The grinding media might be flint, pebbles, porcelain balls, high density synthetic balls, or steel balls. Irregular shaped flint pebbles with high density do a better grinding job than porcelain balls. However, the newer high density synthetic balls have been rated between pebbles and steel balls in efficiency. The most efficient media have been found to be steel balls. When formulated properly, more rapid grinding and better texture are obtained when using the smaller steel balls. Some of the advantages in using small size balls are (1) more grinding contacts per revolution; (2) smaller voids which limit the size of the lumps and agglomerates trapped among the balls; (3) less heat is generated.

The Pigments Laboratory of the American Cyanamid Co. has obtained excellent results with pebble mills using a pebble load of 30% total mill volume and a mill paste charge of about 35% of the total mill volume. Naturally, results differ with changes in viscosity, manner in which mill is loaded, type of vehicle and amount of solids in the grinding vehicle. Various pebble mill studies have indicated that a viscosity of 60-90 KU produces excellent results.

The pebble mill type of dispersion gives a wide latitude as to formulation of the mill charge, since a variety of combinations of pigment, vehicle solids and thinner can be used. Lowering the vehicle solids permits a higher loading of pigment with a higher output of finished enamel.

Using a titanium dioxide alkyd architectural enamel formulation, a study was made of the grinding characteristics with variations in the concentration of pigment and non-volatile vehicle. Table I presents some of these results.

Table I represents quite a spread in pigmentation from the full formula grind to the lowsolids grind. The full formula presented a more viscous vehicle and in order to reach satisfactory texture, a longer period of time was required than that recorded for the low solids grind. However, it should be remembered that in low-solids grinding sufficient non-volatile vehicle must be present to satisfy the surface of the particles as they are made available during the grinding.

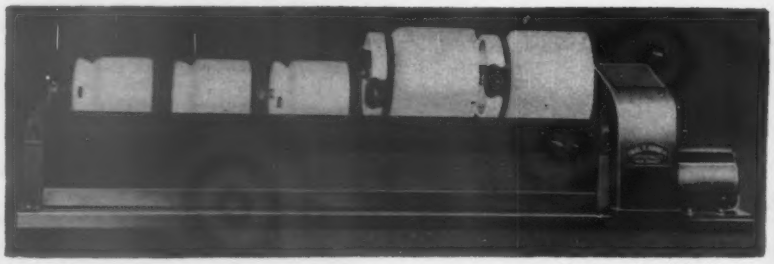
It is for these reasons that so many different sizes and types of laboratory ball and pebble mills are used in evaluating the dispersion and working properties of pigments.

Mill Loading: 65% of Total Volume { 35% Paste / 30% Pebbles

Pigment (*Grams*)	Mill Charge Resin Solution (70% N.V.) (*Grams*)	Thinner (*Grams*)	Pigment (%)	Viscosity (*KU*)	Hegman Texture Rating 18 *hrs.*	42 *hrs.*)
222.0*	318.0*	113.0*	33.9	61	6½	8
304.3	435.0	—	41.2	Off scale	0	½
295.0	347.0	75.3	41.2	82	6	8
460.0	270.0	107.0	55.0	81	6	7
735.0**	41.2**	246.0**	71.8	63	6 (6 hrs.)	7½ (23 hrs.)

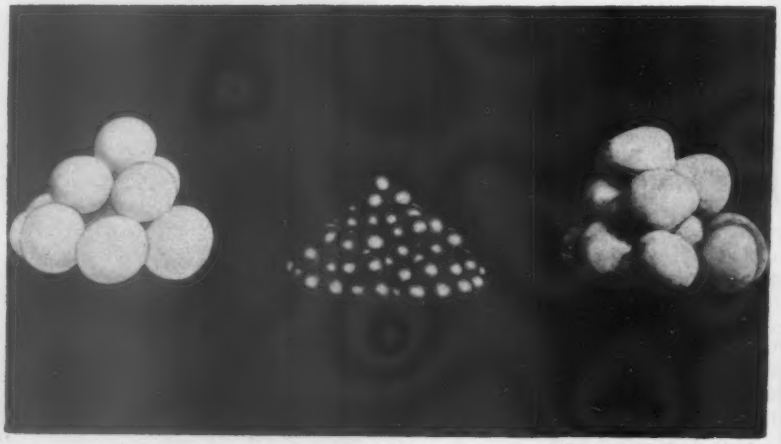
*Full formula **"Low-solids"

Table I



Courtesy of Paul O. Abbe, Inc.

Typical jar rolling mills.



Courtesy of Paul O. Abbe, Inc.

Some types of grinding media used in ball mills.

Perhaps you have a gadget of gimmick that is doing a special job in your plant. Would you like to share this production technique with your fellow production men? If so, simply forward us a write-up of your technique together with rough sketches of any equipment used, and we will do the rest. Our address is: Paint and Varnish Production, 855 Ave. of the Americas, New York 1, N. Y.

SOVIET PAINT TECHNOLOGY

U.S.S.R. ABSTRACT


A BRIGHT NEW STAR . . . OUTSTANDING PERFORMER
TECH GRADE
Pelletized Pentaerythritol
DUST LOSSES MINIMIZED
KETTLE TIME REDUCED
Pelletized Pentaerythritol . . . a new development

PAINT TECHNOLOGY IN THE

IN the interest of keeping the readers of *Paint and Varnish Production* abreast of foreign developments in coating technology, PVP's editorial staff has just completed an analysis of paint technological progress in the Soviet Union.

PVP's survey shows that Soviet paint technology is geared toward the development of products whcih have some strategic application, whether industrial or military. In this connection, Soviet technology in developing coatings from silicones, epoxies, phenolics, polyesters, etc., seems to be on par with work being carried out in the United States. Obviously, the value of such coatings in rockets and high speed aircraft has undoubtedly spurred the Soviets to conduct intensive research programs in these fields. To give you some idea of the calibre of this research activity, PVP's staff has

Here in America, paint manufactures are fully cognizant of the important work which is currently being done by other countries in the various phases of paint technology and manufacture. Those of us who have had the opportunity to keep abreast of foreign technical papers are well aware of the progress that are friends abroad are making in the paint field.

In this connection, Paint and Varnish Production is proud to present a monthly feature on paint developments abroad. Kicking off this feature is an up-to-date analysis of paint technology in the Soviet Union. Future issues will cover western European countries, India and Japan.

This monthly feature will afford you the opportunity of learning and comparing both paint manufacturing techniques and technology thoughout the world.

Rocket arms in Red Square, Moscow, being displayed during the celebration of the 40th anniversary of the Great October Socialist Revolution.

uncovered two interesting developments, one in polyester coatings and the other in silicone resins.

The Soviets have recently developed fast-drying polyester coatings by combining butylorthotitanate with vegetable oils such as sunflower and cottonseed. Coatings prepared from the above combination are said to have good adhesion, flexibility, toughness, plus fast drying properties. The mechanism of drying was found to be a combination of partial hydrolysis and polycondensation, accompanied by the separation of butoxylic groups resulting in the formation of insoluble products.

Thermostability of silicone resins is being investigated by the Soviets, since this is an important factor in determining the maximum working temperature and length of service of silicone coatings for electrical insulation. One result of this investigation revealed that thermodestruction of polymethyl phenyl siloxane varies with the chemical nature of the catalyst. Specifically, metal salts of stable valency cause more intensive polymer decay along the Si-O bond, while metal-salts of unstable valency, capable of forming several oxides, catalytically influence the breakdown of the siloxane bond as well as the radical oxidation processes. This study also revealed that the introduction of pigments into polymethyl phenyl siloxanes lowered the thermo-elasticity of the formed films, but in the ester-modified polymethylphenyl siloxanes, pigmentation markedly increased the thermostability of the coating.

Finishing Operations

Finishing operations in Russia have not reached anywhere near the state of development as in the United States. For example, in the spraying of solventless coatings such as the polyester type, commercial application has been retarded due to the lack of specialized spraying equipment needed with solventless coatings. However, the various scientific and research institutions of the U.S.S.R. Ministry of Chemical Industry are currently engaged in research for both developing new types of lacquers and spraying methods. Considerable work is being done on formulating high solids lacquers with improved film properties. Hot-spray application for improving the quality of wood finishing and reducing the cost of finishing operations in the furniture field are also being studied by the Soviets. It must be remembered that these developments are still in the laboratory stage and have not reached commercial feasability.

Phenolics

One feature of the Soviet paint industry is the predominance of phenolic-type coatings. Phenolic coatings in the U.S.S.R. hold pretty much the same position that alkyds hold in the U.S.A. In analyzing this situation, one discovers that the Soviet chemical industry produces considerable amounts of phenol. In the U.S.S.R., phenol is commercially produced from shale oil while substituted phenols on an industrial scale are obtained from two methods: alkylation of phenols by alcohols, and alkylation by olefins.

By contrast to the U.S.A., alkyd coatings are produced on a very limited scale in Russia. This is understandable since Russia lacks adequate supplies of the basic raw materials such as phthalic anhydride, maleic anhydride, glycerine and other polyols. Khrushchev, himself, stated about three months ago that the Soviet Union was willing to accept technical aid from the West to build up Russian chemical industry. In soliciting this aid, he particularly stressed the output of synthetic fibers, plastics, synthetic rubber and resins. To meet Khrushchev's goals, Russian engineers are seeking Western "know-how" to build plants which can produce large tonnages of titanium dioxide, di-isocyanates, polyethylene, polyurethane, melamine, acrylonitrile, phthalic anhydride and maleic anhydride.

Extensive research in the field of alkyd resins is being carried out by the Soviets, indicating that the Russians aim to produce alkyd coatings as soon as they have adequate supplies of the basic chemicals which go into these resins. Current studies involve the effect of various catalysts upon the condensation reaction of glycerine and phthalic anhydride. Possible resin formation with xylenol and phthalic anlydride are also being studied.

Polymer Science

In the field of general polymer science, the Soviets are moving at a rapid pace, according to Dr. Herman F. Mark, Director of Polymer Research Institute of Polytechnic Institute of Brooklyn. Dr. Mark recently conducted six seminars in Russia on high polymer chemistry. While visiting Russia, he had the opportunity to observe important achievements in the field of chemistry at various technical institutions in Moscow and Leningrad.

Basic research in the field of

polymer science is considered to be at a high level, according to Dr. Mark. Pioneer work on "popcorn" polymer is now being conducted in the Soviet laboratories. An interesting new method of polymerization through bifunctional recombination at moderate temperatures has recently been developed in Russia. Since polymerization by this method takes place at low temperatures, there are no complicating side reactions and it is possible to obtain linear soluble products of high melting points. The Soviets are also conducting laboratory studies on high pressure polymerization of ethylene plus low pressure techniques similar to Ziegler's and Natta's work.

One of the hottest developments to come out of the U.S.S.R. is the work carried on by Prof. Nesmijanov, Director of the Institute of Element of Organic Compounds in Moscow on ferrocene compounds. This work is devoted to the synthesis of organic compounds which contain inorganic elements such as phosphorous, magnesium, aluminum, silicon, titanium, etc. These compounds exhibit unusual reactivity and micro- and macromolecules of such materials show good stability. Nesmijanov is now conducting a broad study on ferrocene-type compounds such as vinyl and ally derivatives, dicarboxylic acids and other polymerizable derivatives.

Testing

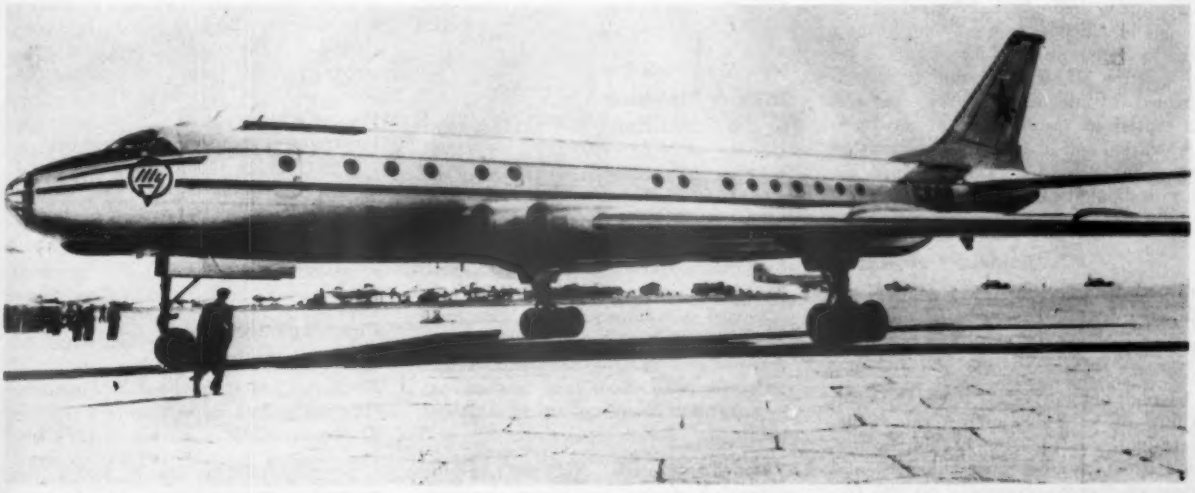
Soviet laboratories are well equipped and have some very fine testing instruments, according to Dr. Mark. For example, the laboratory at the University of Moscow is distinguished by a series of extremely precise instruments to measure viscosity and elasticity of polymer solutions, plus an electronic microscope of high resolving power, adiabatic colorimeter of high sensitivity, and a very sensitive flow birefringence apparatus which can produce very high rates of shear of polymer solutions.

With regard to paint testing methods, the Soviets have not come up with anything unusual. However, the Soviets have developed an interesting method for measuring thickness and film continuity of lacquer coatings on metal. This method is independent of magnetic properties which leave the coating intact. The method is based on the change in condenser capacity caused by the varying thickness of the non-conducting layer of the coating. This method is said to be correct within 3-5 percent. This apparatus is also capable of detecting flaws (pores, etc.) in coatings. An electrolyte is used as a means of contacting the surface.

In assessing the present status of Soviet paint technology, it must be concluded that in research and development the Soviets are making strides and have been successful in those fields which have an immediate military significance. Because of the low standard of living in Russia (many are living in homes and apartments without adequate plumbing facilities), hardly any effort is being directed to develop trade-sales or "do-it-yourself" items. Thus, little is being done to develop such products as latex paints.

The Soviets are conducting considerable fundamental and applied research on cellulose products and wood chemicals such as rosin, terpenes, etc. Estimates place U.S.S.R. production of cotton at 2.4 million tons per year. In addition, she possesses the largest wood supply in the world. Consequently, the Soviets are giving top priority to the development of paint raw materials derived from cotton and wood chemicals.

While it may appear that Soviet paint technology has a long way to go to match U.S. developments, it must be borne in mind that the Soviets are capable of achieving a high level of development within 2-3 years through a "crash program." This is exactly what they are currently doing in the plastics field. The principal obstacles facing the Soviets are lack of basic raw materials (particularly petrochemicals), lack of applied resin technology and "know-how", and most important, lack of application engineers.



The new jet liner Lubalev #14 will be used to fly passengers to the western world. The plane carries 100 passengers and has a speed of approximately 600 miles per hour. Soviet paint technology stresses the development of superior protective coatings for aircraft, missiles, and other space advances.

ABSTRACTS

The following represent abstracts from recent Soviet technical publications of interest to the coatings field:

Vinyl Ester Coatings

By V.V. Korshak, M.F. Shostakovickii, A.A. Ivanova, & N.A. Gernsfein, "Zhurnal Prikladnoi Khimii," 30:1368-1374, 1957.

Film-forming substances based on higher fatty acids were synthesized from vinyl esters of the latter, and subsequently polymerized and copolymerized. A practical method is proposed for the preparation of such substances based on fatty acids of cottonseed oil by the vinylation of the latter; the obtained esters are copolymerized with 15-per cent oil at lower temperatures. The method prevents a hydrolytic decomposition of the vinyl esters, and the resulting product has a low contents of free fatty acids. The physical, mechanical and weather-resistant characteristics of paint coats based on copolymerizing vinyl esters with tung oil are not inferior to the corresponding properties of films based on natural drying oils. They dry analogously with linseed oil films; a dessicate must be added, however.

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Good & Poor Polymer Solvents

By A.A. Tager, "Uspekhy Khimii," Vol. 28, 4:481-487, 1958.

A discussion of the differences in interpretation of the "good" and "poor" qualities of polymer solvents, and an attempt to define both. A good solvent is one in which a given polymer forms a thermodynamically stable system, i.e. a solution whose formation is accompanied by decrease in the chemical potential of the solvent, at any concentration and in as wide a temperature range as possible. The obtained solution should be transparent.

•

Congealing Carbamide Resins

By K.F. Sevast'ianov, "Derevoobratatyvaiushchaia Promyshlennost'," 2:9-11, February 1958.

Result of an investigation of the hardening of urea-melamine resins. Determination of the effect of temperature, amount of ammonium chloride, and time of thermo-processing on the formation of water-insoluble products in the resin.

Weather-Durable Oil Paints

By C.V. Iakubovich, V.A. Zubchuk, & M. P. Peresvetova, "Standartizatsiia," 2:68-69, 1957.

The substitution of heavy spar (filler) by talc in oil paints used for exterior coating has the effect of impeding humidity penetration, this increasing the climatic durability of the product. The authors tested 450 preparations, and propose new standards and set up new formulae for weather-proof oil paints. The 1 : 1.3 ratio of zinc white to talc produces best weather-resistant qualities in the paint. Glyphthalic drying oil was found to compare in quality to natural paint vehicles. The stability to atmospheric conditions of the new paint based on talc, zinc oxide and glyphthalic or natural drying oil is three times higher over that of standard products. The new oil paint finishes retain satisfactory external appearance for 2-2.5 years.

•

Furniture Finishing by Lacquers

By S.I. Sverdlov, "Derevoobrabatyvaiushchaia Promyshlennost'," 7:22-23 April 1958.

During the experiments carried out at the Tallin Furniture Factory, two nitro-lacquers proved of potential value for class 1 furniture finishing: the NC-312 and NC-314 lacquers. The former has a relatively high contents of film-forming substances (22-25 percent dry residue); the number of coats necessary for satisfactory furniture finishing is three to four. The author presents the results of the test. Following the experimental series, a new method of technological furniture-finishing processes has been proposed; the latter is contrasted (in table form) with the old procedures. The lacquers were prepared by the Central Project-Control Bureau.

•

New Materials for Interior Finishing

By M. Makotinskii, "Arkhitektura USSR," 3:26-29, 1958.

Dry water-soluble paints are one of the means to embelish the interiors of Soviet homes, and considerable effort is spent to improve their quality for house, room, and furniture finishing. In 1955, the Institute of Home Architecture compiled a scheme of dry paint mixtures incorporating a number of selected pigments, stable to light. The consumer purchases ready colors, to be dissolved in water and easily applied by amateur painters.

Other materials discussed in the article are plastics, wall paper, linoleum, etc., and some newer developments in their application to interior finishing.

Fast-Drying Coatings

By V.S. Kiselev & T. A. Ermolaeva, "Zhurnal Prikladnoi Khimii," 31:111-116, January 1958.

The authors have established in previously (1956-1957) published reports that butylorthotitanate combines with mono- and diglycerids of vegetable oils and with fatty acids of vegetable oils to yield products with film-forming characteristics. The present paper describes the preparation of fast-drying coatings from polyester resins, based on sunflower and cottonseed oil, and butylorthotitanate. The fundamental process during butylorthotitanate drying was found to be partial hydrolysis and polycondensation, accompanied by the separation of butoxylic groups and the formation of insoluble products. Esterification takes place during the reaction of butylorthotitanate with hydroxyl-containing compounds such as mono- and diglycerids of vegetable oils. The resulting products possess film-forming properties. Butylorthotitanate reacts with fatty acids of vegetable oils to produce film-forming compounds. When oleic acid reacts with butylorthotitanate, the former undergoes esterification by the separating butylalcohol, simultaneously with the formation of titanium salts. Upon hydrolysis and condensation, the titanium derivatives yield polymeric products which may be separated by molecular distillation. Coats of semi-viscous lacquers, prepared from polyester resins, dry completely under hot-drying conditions; when butyl-orthotitanate is added to them, the coatings dry in a short period under both hot- or cold-drying conditions. The condensation reaction appears to be on the bottom of the fast-drying properties of the coatings. In the presence of atmospheric humidity, partial hydrolysis and condensation of butyl-orthotitanate also take place. It is concluded that the coatings, prepared from polyester resins (sunflower and cottonseed oils) and butylorthotitanate represent a new type of varnish coatings, possessing the valuable properties of polyester resins—good adhesiveness and elasticity, combined with fast drying and hardness, characteristic of butyl-orthotitanate films.

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Pigment Effect On Silicone Coatings

By K.A. Andrianov & M.B. Bromberg, "Khimicheskaia Promyshlennost'," 1:12-17, January 1958.

Thermo-stability, as a factor determining the maximum working temperature and length of service, is of major importance in considerations on

the use of polymethylphenylsiloxane coating in electrical isolation. Heat stability depends on the nature and properties of the polymer employed in the manufacture of polymethylphenylsiloxane coatings; at the same time, however, the pigments and catalysts may also affect their properties. The authors discuss thermo-oxydation decomposition by polymethylphenylsiloxanes, which was found to affect both the Si-O and Si-C bonds. Resistance to heat of polymethylphenylsiloxane resins under the action of various catalysts was determined and tabulated; the catalysts were found to accelerate the process of destruction and thermo-aging. The mechanism of polymethylphenylsiloxane destruction varies with the chemical nature of the catalyst: metal salts of stable valency cause more intensive polymer decay along the Si-O bond, while metal salt catalysts of unstable valency, capable of forming several oxides, catalytically infuence the breakdown of the siloxane bond as well as the radical-oxidation processes. The introduction of pigments into polymethylphenylsiloxanes was found to result in lowering the thermo-elasticity of the formed films. At the same time, pigmentation markedly increases the thermo stability of ester-modified polymethylphenylsiloxanes. Large amounts of pigment lower the weight-losses during thermo-oxydation destruction; at high temperatures, the stability of much-pigmented films rises sharply.

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New Materials For Furniture Finishing

"Derevoobratabyvaiushchaia Promyshlennost'," 2:23, February 1958.

Various scientific and research institutions of the USSR Ministry of Chemical Industry and of other organizations are currently engaged in research aiming at preparation of new lacquers. Use is made of the latest developments in that field in Poland, Hungary, and Czechoslovakia. Some of the recent products of the Scientific Research Institute for Organic Semi-Products and Dyes feature high-quality lacquers; for example, the CN-312 lacquer has a high dry-residue contents, the colorless CN-316 lacquer possesses a superior diffusion ability. These recent products reflect the preoccupation of the Soviet chemical industry to manufacture products capable of withstanding harder technological conditions. In 1958, the State Research and Project Institute of the Chemical Industry (GIPI) is doing research on hot-application lacquers which are expected to radically reduce the cost of nitro-lacquers and to improve the quality of wood-finishing. Another institute engaged in hot-lacquer investigation is the Central Research Laboratory of the All-Union "Lakokraspokrytie" Board. The State Research and Project Institute of the Chemical Industry (GIPI) is currently studying lacquers with a high content (95-98%) of film-forming materials based on polyester resins. Lacquers of this type have already been prepared at the Institute, although their testing under manufacture conditions has been retarded due to lack of special equipment.

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Coumarone-Indene Resins

By T.E. Gimel'shtein & O.V. Iastrahembskaia, "Koks i khimiia," 5:35-37, 1958.

In contrast to Western Germany and the United States, production of coumarone-indene resins in the USSR amounted to small quantities; in addition, the product was of dark color. In 1955, the the Kadiev coke chemistry plant founded a central agency for exploitation of coumarone-indene resins; the product manufactured there at the present time melts at 95-110°C. Most of this resin is currently employed in the Soviet paint and varnish industries; smaller amounts in the manufacture of glue and as leather substitutes. The starting material for coumarone-indene resins is mainly heavy benzene.

The cost of coumarone-indene resin (2,600 rubles/ton) establishes it as a replacement for rosin (4,950 rubles/ton) and vegetable oils (10,000-12,000 rubles/ton).

As the most important step toward improved technology of production, the authors advise to introduce the vacuum process (to retain the maximum of film-forming substances). Broader scope of applied research in the field of coumarone resin application is also urged.

•

Film-Forming Substances Based on Drying Oils

By A.A. Ivanova, "Zhurnal Prikladnoi Khimii," 31:279-289, February 1958.

A further investigation is described of preparing drying products from semi-drying and nondrying oils, by a method originally developed by author in 1937 and consisting of hydroxylation of the semi- or nondrying oil, followed by the dehydration of the hydroxylated product. It was now established that the side processes, occurring during hydroxlation (via air oxydation), increas the film-forming ability of the oil. Conditions were determined for carrying out intramolecular dehydration of non-drying castor oil in presence of sodium bisulphate; this process, which permits to separate dehydration from polymerization, is of major practical significance in dehydration methods striving for a standard quality of the drying product. Firm films were obtained from poorly drying oils by adding to them, during their dehydration, small amounts of pentaerythrite. The stability of semi-drying-oil films increases on dehydration of hydroxylated triglycerides, preceded by their vinylation (reaction with acetylene). The dehydration and hydroxylation process, which has been factory-tested and is about to be exploited commercially in the USSR, is applicable to various types of semi-drying oils (such as cotton-seed oil) as well as to shale oil.

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Preparation of Substituted Phenols

By V.I. Isagulianc, "Khimicheskaia Promyshlennost'," 2:84-90, 1958.

The following materials, based on substituted phenols, are manufactured at the present time on industrial scale in the Soviet Union: a) additives for quality improvement of various petroleum products such as engine fuels, lubricants etc.; b) alkyl- and aryl phenol-formaldehyde resins, fully soluble in vegetable oils; c) polyoxyetherized alkyl- and aryl-substituted phenols, possessing surface-active properties, exploited in the manufacture of detergents, emulsifying agents etc.; d) alkyl- and arylphenoxy acetic acid, having growth-stimulating and herbicide effects; e) synthetic aromatic substances.

In the USSR, synthetic phenol-formaldehyde resins prepared by phenol substitution find widest application in the preparation of lacquers and enamels, on account of their ability to form high-quality coatings.

The methods used currently in the USSR for obtaining substituted phenols on industrial scale are two: alkylation of phenols by alcohols, and alkylation by olefins. Both methods are discussed, as is alkylation in the presence of iron-exchange resins.

•

Rotating Conveyor For Furniture Finishing

By V.P. Ogurcov, "Derevoobrabatyvaiuschaia Promyshlennost'," 3:24-25, March 1958.

The author describes the design and operation of a rotating conveyor for lacquer-spraying, drying etc., manufactured by the Pomenskaia Furniture Factory. The conveyor is manned by one sprayer and two polishers. The cost of production is 30,000 rubles. Its installation saved the factory 180,000 rubles in one year.

Preparation of Resinate Lacquer

By F.I. Koriemkin, "Gidroliznaia i Lesokhimicheskaia Promyshlennost'," 1: 13-14, 1958.

Rosin solutions, obtained during extraction of resin residues from the soft rosin wastes of rosin-turpentine manufacture, are good sources for the preparation of resinate lacquers. The wastes are treated by a solvent—turpentine or white spirit (turpentine substitute)—to yield a solution which represents a rosinous lacquer. The latter, due to its high acidity etc. in not satisfactory. If the rosin in the solution is substituted by resinate, the drawbacks are largely eliminated. The most suitable compound is calcium resinate which has a substantially higher melting point than rosin; having lower acidity, the resulting resinate coatings (depending upon the rate of solvent evaporation) form hard and mirror-like surfaces. The resinate coating dry more rapidly than those of rosin lacquers.

Resinate lacquer has been used successfully as a diluent (drying oil substitute) for thick oil paints.

The formation of calcium resinate in rosin solutions (with white spirit as solvent) proceeds within wide temperature brackets; the authors carried out the substitution at low temperatures and without heating the solvent. Their experiments, carried out at temperature range of 20-98°C., are described, and the characteristics of the obtained lacquer tabulated.

•

Determining Thickness & Continuity of Lacquers

By I.L. Rozenfeld' & Iu. P. Ol'khovnikov, "Zavodskaia Laboratoriia," Vol. 24,2: 173-176, February 1958.

The usual methods of coat-thickness and continuity determination have relied upon electromagnetic properties and means, or have damaged the coat surface. The present paper proposes a method independent of magnetic properties which leave the coating intact. It is based on the change in condenser capacity with the varying thickness of the non-conducting layer of the coating. The determination is correct to 3-5 percent. The apparatus is described; it is capable of detecting flaws (pores etc.) in coats. An electrolyte is used as a means of contact with the surface.

•

Chlorinated Tricresylphosphate As a Plasticizer

By V.A. Voskresenskii, "Khimicheskaia Nauka i Promyshlennost'." Vol. 3, 2:285, 1958.

A preliminary report on the preparation of a non-inflammable plasticizer and plastic material, believed to be of potential value to the industry on account of its superior physico-mechanical properties. Direct chlorination of tricresylphosphate by gaseous chlorine was carried out at room temperature in absence of a catalyst. The reaction is exothermic (end temperature about 85-90°C.). The product (trichlor-tricresylphosphate) is a transparent plasticizer, slightly yellowish in color and of a weakly specific odor. When introduced into polychlorvinyl resins at 135-140°C. in varying weight proportions, a transparent and elastic film was obtained. The paper tabulates: Physico-mechanical properties at various resin/plasticizer proportions; stability of films to benzene, water, hydrogen peroxide, HNO_3 etc.; and stability to frost.

•

Paints Based on Oil-Soluble Phenolic Resins

By A. Ia. Drinberg, V.M. Kobeckaia, E.S. Gurevich, & O.N. Ustinova, "Khimicheskaia Promyshlennost'," 3:163-166, 1958.

Shale phenols, obtained from shale distillation products, may be used for the preparation of 100 per cent, oil-soluble phenol-aldehyde resins. A method is proposed for the separation of these phenols, by treating shale oils with an alkali solution; standard products are obtained, and the quality of the fuel oils is said to improve. High-quality oil-soluble phenol-aldehyde resins are obtained upon adding a mixture of shale phenols to synthetic (or coal-tar) phenol in proportion of about 60:40; high-quality fillers and paints (oil type) are prepared on the basis of phenol-aldehyde resins from combinated phenols, which differ in their stability to water and atmospheric conditions. The use of paints based on shale-phenol aldehyde resins permits to lower significantly the consumption of glycerin and phthalic anhydride in the manufacture of glyphthalic resins. The paper tabulates the following data: Properties of phenols extracted from shale oils; composition of phenols from shale oils; component ratios and condensation conditions in the preparation of 100 per cent resins; and some properties of the fillers and paints prepared on basis of these resins.

•

Condensation of Xylenols

By N.V. Shorigina & G.I. Kurochkina, "Zhurnal Prikladnoi Khimii," Vol. 30,5:810-813, 1958.

Recently, the authors described a method of preparing lacquer resins by condensation of xylenols. The present study investigated the possibility of alkaline condensation of xylenols, particularly: a) the influence of the xylenol-to-formaldehyde ratio; b) the effect of various catalysts; c) the effect of various condensation conditions. In contrast to the figures given in the literature, the optimum xylenol-to-formaldehyde proportion was found to be 1:2 (in the preparation of water-soluble xylenol-formaldehyde resins). Resins of a higher quality were formed as a result of a two-phase condensation (acidic, followed by alkaline). Sodium hydroxide was found to be the most suitable catalyst.

•

Paint & Varnish Coating

By B.V. Liubimov, "Vestnik Mashinostroeniia", Vol. 38,3:59-63, March 1958.

More than one-half of Soviet metal products are protected against corrosion by paint and lacquer coatings. The article presents, in form of tables and short general text, the more common Soviet paints and varnishes and their use in protective and decorative coating of machinery and apparatus. In six tables, the following is presented: Composition of the more common paint and varnish coatings used in the Soviet Union, and instructions for their application (Table 1); lacquer solvents, in context with brief description of lacquer-coating technology (Table II); methods of aluminum oxydation (Table III); priming materials, by trade-marks, and their applications (Tables IV and V); drying methods and their properties (Tabel VI).

•

Ski-Finishing Lacquer

By G.L. Mishchenko, "Derevoobrabatyvaiuschaia Promyshlennost'," 7:28, April 1958.

A new lacquer for ski finishing, prepared and tested at the G.I.P.I. institute of chemical industry, contains 48 to 50 percent of film-forming substances (more than any other similar Soviet product). The coats are colorless, stable to light, elastic, and possess satisfactory hardness. When polished, they retain a shiny surface for a long period of time. The lacquer dries in 1.5 hours at a temperature of 18-20°C and at 60-65 percent humidity. At 45°C, the drying period is 45 minutes. It may also be used for finishing of furniture, wireless, and TV sets. The composition of the lacquer, and a recommended technological process of ski-finishing based on its application, are given

PAINT and VARNISH Production

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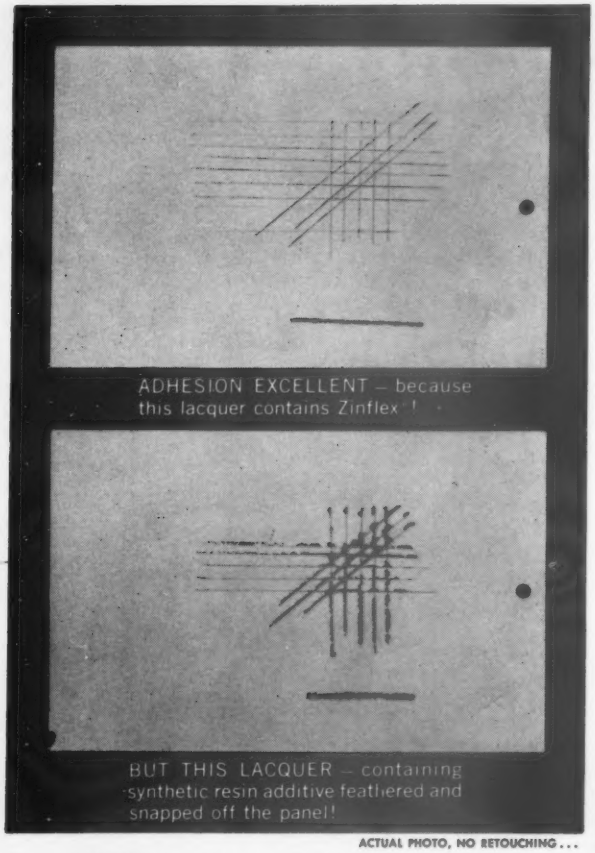

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NEWS

NEWS OF COMPANIES, ASSOCIATIONS
TECHNICAL GROUPS
ITEMS OF GENERAL INTEREST

Paint Survey Shows Rise In Color

The latest color survey released by the National Paint, Varnish & Lacquer Association shows that color has invaded and conquered the home decorating field. These 1957 color statistics have been compiled from nation-wide sales reports of paint manufacturers.

The use of white as a wall color has declined steadily since 1950 the survey states emphatically. However, the use of white has a decorative trim has increased.

Dark enamels, as opposed to those of medium or light strength, have risen from 6 to 14% of the market.

Green is indicated by the paint industry survey to be the most popular paint color. The American Institute of Decorators is forecasting that yellow-green (chartreuse or citron) will increase in popular esteem.

Over one-half of interior flat paints sales are of clear light hues. Dark shades have also increased in sales to 6% from a low of 4% in 1955.

Beige is top-favorite among the neutral hues. This is born out by the paint industry's survey that shows light-brown paint sales had increased 86% over the previous year. There are indications that another neutral hue—gray—is climbing in popularity.

The survey shows that sales of interior red have been good and are climbing upward, having doubled since 1950. The red family includes pink, peach, shrimp, flame, and other tint tone variations. According to some decorating forecasts, apricot, melon, and rasberry are other red-family colors that will soon show themselves to be leaders in the home furnishings field.

Yellow accounts for one-tenth of sales of paint colors. Pure blues have taken over from turquoise. Blue-green is being retained as an accent hue.

The survey indicates that color has "arrived" on the outside of the house as well as the inside. Sales of white paint for outside use have declined steadily since 1950. However, three-fifths of exterior paint sales today are still white.

Green paint sales for exterior use were at 9.3%. Yellow is also important for outside use and even orange is improving its status.

•

New High for General Mills

General Mills has reported the best sales and earnings records in its 30-year history.

During the 12-month period ended May 31, 1958, sales records reached a new high of $529,820,000. The 1957-58 year marked the eighth consecutive fiscal period in which dollar sales volume exceeded that of the previous year.

Net earnings of $14,694,000 were up $2,458,000 above last year. Earnings per share of common stock were $5.94, as compared with $4.88 last year. Dividends paid continued at $3.00 per share of common stock and the regular 5% on preferred, the total amounting to $7,956,000.

FIFTIETH ANNIVERSARY: Luther H. Schroeder, treasurer of the Sherwin-Williams Co., was recently honored at a testimonial dinner for having completed fifty years of service with the company.

Representative Named

The H.D. Thornley Co. of Wilmington, Del. has been appointed technical sales representative for the Sole Chemical Corp.

The Thornley organization will cover the eastern half of Pennsylvania, Delaware, Marland, D.C., Virginia, West Virginia, and the south and west portions of New Jersey.

VINYL STEARATE: John A. Hill, right, president of Air Reduction Co., Inc., and C.J. McFarlin, president of the Air Reduction Chemical Co. division, discuss display of products in which vinyl stearate have strong potential uses. Two million pounds per year Air Reduction plant, the first to produce vinyl stearate in commercial quantities in the United States, is now on stream at Calvert City, Ky.

NEWS

46th Annual Meeting Of Canadian Assn.

The 46th Annual Meeting of the Canadian Paint, Varnish & Lacquer Association will be held at the Royal Alexandra Hotel, Winnipeg, September 29—October 1, 1958.

The program for the meeting is a follows:

SUNDAY, SEPTEMBER 28

6:00 P.M.	Registration.
7:30	Directors meeting.

MONDAY, SEPTEMBER 29

9:30 A.M.	Chairman: **R.C. Williamson.** 46th annual meeting. Minutes of last meeting. Financial report. Report of nominating committee. Report of president and general manager.
10:15	Chairman: **A.K. Stephens.** First business session.
12:30 P.M.	Luncheon.
2:00	Chairman: **A.K. Stephens.** Second business session.
6:00	Reception sponsored by raw material suppliers.
7:00	Annual dinner.

TUESDAY, SEPTEMBER 30

8:00 A.M.	Directors Breakfast.
9:00	Chairman: **A.K. Stephens.** Third business session.
1:00 P.M.	Annual golf tournament.
7:00	Annual golf dinner.

WEDNESDAY, OCTOBER 1

9:00 A.M.	Directors meeting.
12:30 P.M.	Directors luncheon.
2:00	Directors meeting.

Foreign Boom Predicted

A booming European market for American paints, based on retail sales of custom-mixed colors, has been predicted by Henri Kunz of Zurich, Switzerland.

Mr. Kunz is western European representative for the Sherwin-Williams Co., Acme Paint Products, and the Martin-Senour Co.

Most European paint companies have expressed little interest in the do-it-yourself retail market up to this time, Mr. Kunz reports. Ar present, with the six-day work week and two-hour lunch period still the general practice in European industry, the average workman has neither the time nor the energy to be his own painter.

The eventual arrival of shorter working hours will give the Europeans the same amount of time around the house as the American has, Mr. Kunz believes. He predicts that American manufacturers will capture a large share of the new retail paint market because of their lead in developing methods of preparing custom colors.

•

Drum-Drying Facilities

Versatile facilities for drum-drying solutions of starches, resins, etc., are now available to chemical processors on a contract production basis according to a recent announcement by Morningstar-Paisley, Inc. The processor's product can be custom drum-dried and ground to specification at Morningstar's recently acquired Haberland Division. The equipment can produce products of various viscosities and concentrations.

The manufacturer's ingredients can be mixed or blended before or after the drying operation to fit the needs of the product.

Contract production facilities are also available at the firm's Hawthorne, N.J. plant which provides controlled processing of water soluble gums, soluble starches, and dextrinized starches and blends.

•

Dr. S.W. Martin Passes

Dr. Samuel W. Martin, a vice president of Great Lakes Carbon Corp. and general manager of the company's research and development department, died recently in Chicago. His age was 47.

Dr. Martin joined Great Lakes Carbon in 1949 as associate director of research. In 1950 he became general manager of research and development. He was elected a vice president the following year.

He had formerly been associated with Portland Gas & Coke Co., Armour Research Foundation, and National Lead Co.

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Hodag Expands

Hodag Chemical Corp., Chicago, has completed construction of new production, laboratory, and office facilities.

Laboratory space has been tripled and office area doubled.

The expansion also includes new facilities for manufacturing silicone antifoams and other silicone products.

SILICONE-BASED PAINT: The high gloss and non-chalking characteristics of a new silicone-based paint are demonstrated by the reflections cast in the side of this automobile. The lower half of the car was painted with the new finish over two years ago. The same paint on this airplane still looks as good as new. The paint needs no touching up even though the plane has logged 350 hours of flight time. The silicone-containing paint is manufactured by the Robeson-Preservo Co., Port Huron, Mich. The silicone resin base is suppled by the Dow Corning Corp., Midland, Mich.

NEWS

Dr. L. R. Thiesmeyer

Thiesmeyer To Give Keynote Address

The Federation of Paint & Varnish Production Clubs has announced that Dr. Lincoln R. Thiesmeyer, president of the Pulp and Paper Research Institute of Canda, will give the keynote address at the 36th annual meeting of the Federation at the Cleveland Public Auditorium in Cleveland, Ohio, on October 6.

The title of Dr. Thiesmeyer's address will be, "Indians, Igenuity, and Insurance."

Trained initially as a geologist, Dr. Thiesmeyer devoted 14 years to teaching and research prior to World War 11 and contributed some 30 professional papers to the literature of that field. In 1941, he assumed major responsibilities in administering a graduate education and research center as educational director of the Institute of Gas Technology in Chicago.

During the final years of the war, Dr. Thiesmeyer functioned as a head technical aide in the Office of Scientific Research and development in Washington. Following the war, he turned his energies to the initial organization and administration of Brookhaven National Laboratory on Long Island. From 1946-1950, he was executive assistant to the director of that atomic energy research center.

Since 1950, Dr. Thiesmeyer has been president of the Pulp and Paper Research Institute of Canada.

Dr. Thiesmeyer was born in Brooklyn, N.Y. He received his A.B. degree from Wesleyan University in 1928 and his Ph.D. in Geology from Harvard University in 1937. He is a member of Sigma Xi and has been an officer in numerous professional organizations. His teaching experience includes Harvard, Wesleyan, Dartmouth, Radcliffe, Lawrence College, and Illinois Tech.

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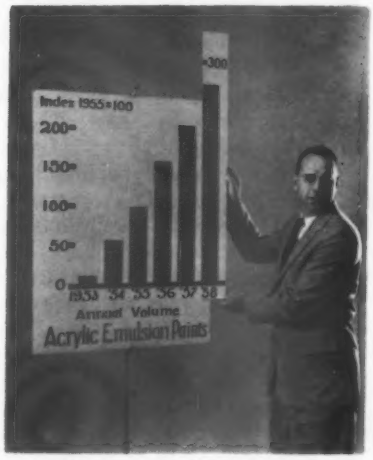
Coulson Co. Appointed

The Joe Coulson Co. has been appointed sales representatives for Pacific Vegetable Oil Corp.

Coulson Co. will act as agents for PVO's line of vegetable oils in the Houston area.



INCREASE OF ACRYLIC PAINT VOLUME: Five-year growth of acrylic paint volume is charted by Rohm & Hass Company's Gerould Allyn for paint refresher course at University of North Dakota. First half volume for 1958 rose to an index figure of 268, illustrated by extra bar held at edge of chart by Mr. Allyn.

Kohnstamm Plans Shift

H. Kohnstamm & Co., Inc., New York, has announced plans to move its executive offices from 83-93 Park Place to 161 Avenue of the Americas. The shift is tentatively scheduled for early fall.

Also announced was that warehouse facilities for some of the industrial pigments of the company, now located at 83-93 Park Place, will be shifted sometime this fall to the Tomkins Tidewater Terminal Warehouse in South Kearny, N.J.

Amoco Sets Price

The Amoco Chemicals Corp. has, as of last July 28, solicited business on phthalic anhydride at a price of 17 cents per pound, F.O.B. plant, freight equalized.

The price will apply to carloads of bags for delivery as soon as the new plant at Joliet, Ill. comes on-stream about November 1.

Annual contracts for 1959 will also be offered at the same price. Present price of phthalic anhydride is 21 cents per pound.

Isophthalic acid will be offered at the same time under the same terms and conditions at a mol equivalent price of 15.2 cents per pound. Previously, this acid had commanded an appreciable premium over phthalic anhydride.

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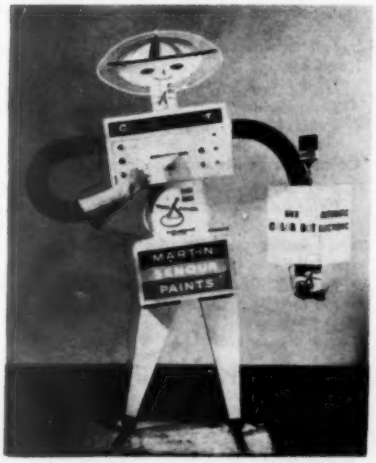
Ashland Acquires Division

Acquisition of the Ohio division of the Anderson-Prichard Oil Corp. by the Ashland Oil & Refining Co. has been announced.

Anderson-Prichard's Ohio division includes plants engaged in solvents and chemical distribution in Cincinnati, Dayton, Cleveland, Akron, Columbus, and Bellaire, Ohio, and in Indianapolis, Indiana.

Anderson-Prichard's division manager, Homer Easterday, will remain as manager of the properties for Ashland.



"MR. COLOROBOT": This is the name of the eight-foot-tall creature with flashing lights, moving arms, and revolving, multicolored "beanie." "Mr. Colorobot," who can be seen in paint and department store windows, was developed in Chicago by the Martin-Senour Paint Co. to call attention to their working Colorobot, an electronic color mixing machine which prepares any shade, tint, or hue of paint.

NEWS

Paint Conference Offers Diversified Program

The December 3-4 BRI Research Correlation Conference of field-applied paints and coatings, scheduled for the Shoreham Hotel, Washington, D.C., will feature a comprehensive program outlined by Harry Ross Young, chairman, market development supervisor in the finishes division of Du Pont, and his committee. Co-sponsored by the National Paint, Varnish & Lacquer Assn. and Painting & Decorating Contractors of America, the program will include:

Introduction.
Paint and Coatings in Use Today. Methods of Application and Surface Preparation.

Paints and Coatings for the Interior of Buildings.
Common Factors Influencing the Deterioration of Paints and Coatings. Paints and Coatings for Wall and Ceiling Surfaces. Paints and Coatings for High Humidity Service and Mechanical Equipment.

Paints and Coatings for the Exterior of Buildings.
Common Deteriorating Influences. Effect of Construction Details Upon Performance of Finishes. Paints and Coatings for Exterior Construction.

Special Paints and Coatings for Industrial Requirements.
High Humidity Applications. High Temperature Applications. Severe Chemical Exposure Applications.

Color with Paints and Coatings.
Functional Use of Colors. Effects of Color on Paint and Coating Performance.

The Economics of Paints and Coatings. The Future of Paints and Coatings.
For the Paints and Coatings Industry. For the Construction Industry.

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Harshaw, Kentucky Merge

Officials of the Harshaw Chemical Co., Cleveland, Ohio and Kentucky Color & Chemical Co., Louisville, Ky., have confirmed that the company's have completed a merger.

Kentucky will continue to operate as a separate subsidiary corporation.

Initial attention is to be concentrated on improvements and additions to the Louisville plant.

SOYBEAN SHIPMENT: Record soybean oil shipment of 40 cars was made recently by Cargill, Inc. vegetable oil division plant in Cedar Rapids, Ia. The shipment, largest single delivery ever made by the plant, represented 320,000 gallons of oil.

Paint Industry Featured On Nationwide Radio

The American paint industry will be featured on a nationwide radio program by Alex Dreier, Sunday, October 5.

The program will be broadcast at 6:05 P.M. (E.D.T.) over the entire NBC network of nearly 200 stations. Mr. Drier's tribute will tie in with the Paint Industries Show which begins the following day, October 6, in Cleveland.

Mr. Dreier will tell his audience of 9,000,000 radio listeners that paints, lacquers, and varnishes are so commonplace to us today that we are inclined to take them for granted, but that our whole way of living would be changed without them.

Mr. Dreier will point put that paint and its allied products are used not only for protection and attractive appearance but also to change the apparent shapes of rooms in homes, to increase or decrease the amount of light, to provide light and safety in school buildings, to aid human therapy in hospitals, to make farm machinery safer, and to increase safety on highways, among many other uses.

He will state that in the early years of our history the ingredients for making paint came from the four corners of the earth, but that now the industry is all-American, producing all the necessary ingredients, and that in fact the paint industry is responsible for two thriving new agricultural businesses—the growing of tung trees and soy beans.

Mr. Dreier will pay tribute to paint scientists and technologists for developing exactly the right type of paint for every conceivable surface, inside or out, under all conditions, as well as paints that dry quickly, leave no odor, and have an amazingly long life. He will point out that the American paint industry leads the world in the race for superior paints, that it was the first industry to form a national association that is still known today as the National Paint, Varnish & Lacquer Assn., with more than 1,500 members from every state, and that it was the first industry to include a code of ethics in its charter.

The NBC-Monitor series of "America on the Go" is sponsored by North American Van Lines. Each of Mr. Dreier's programs salutes an activity or an industry at the time of its annual trade show or exposition.

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Chemurgy Div. Transferred

Negotiations for the transfer of the Glidden Company's chemurgy division to Central Soya Co., Inc., Fort Wayne, have been completed.

Glidden's chemurgy division facilities consist of soybean processing operations in Chicago and in Indianapolis and grain storage facilities located in Chicago, Indianapolis, Seneca and Lockport, Ill.

PERSONNEL CHANGES

GOODYEAR

R.S. Earhart has been appointed manager of the company's international corporation chemical division, it has been announced.

R. S. Earhart

Former assistant general sales manager of the domestic chemical division, Mr. Earhart has been acting manager of the international group since 1957. He replaces **R.E. Workman** who recently was appointed assistant general manager of the chemical division.

In his new post, Mr. Earhart will be responsible for the firm's chemical division sales in the foreign countries of the free world.

Mr. Earhart first joined the firm in 1940 in the budget sales department of the Dayton, Ohio store.

He is a graduate of Ohio Wesleyan University.

John H. Drexler 111, former special representative in Germany for the international group, has returned to the company's domestic organization, it has also been announced.

He will be special representative in the chemicals division's Philadelphia district. He will be concerned primarily with the paint industry and the Pliolite S-5 and VT resins and Pliolite latices produced by the firm.

Prior to his foreign assignment, Mr. Drexler was a technical representative for the chemicals division with offices in Cleveland and New York.

He is a 1940 graduate of Rutgers University.

Other changes include three new district managers for the chemical division. Appointed to fill the posts are **A.R. Merritt,** Hartford, Conn.; **L.P. Thies,** Detroit, Mich.; and **L.E. Stanton,** Houston, Tex.

JONES & LAUGHLIN

Dr. Carl M. Marberg has been appointed manager, technical services for the container division it has been announced.

Dr. Marberg formerly served as director of research with Inland Steel Container Co. Prior to that, he was an assistant professor, Sprague Institute, University of Chicago.

He received his doctorate in 1930 from the University of Chicago.

HODAG CHEMICAL

Richard Anderson has become field engineer for the firm's antifoams, flocculating agents, and other surface-active agents, it has been announced.

Mr. Anderson has had extensive experience with chemical companies, including two years with Thiele Kaolin Co., three and one-half years with Benlo Chemicals, and three years with the United States Movidyn Corp.

He is a chemical engineering graduate of the University of Wisconsin.

HERMAN HOCKMEYER

Norman Schabel has been appointed sales representative, it has been announced.

Mr. Schabel will be headquartered in Cleveland, Ohio. He will serve the northern Ohio area.

AMERICAN MINERAL SPIRITS

Richard V. Hinman has been appointed eastern sales manager, it has been announced. He will be headquartered in the Amsco general eastern offices, Murray Hill, N.J.

R. V. Hinman

Mr. Hinman was formerly assistant eastern sales manager.

He has been with the firm for more than 20 years, having originally joined the Amsco Navigation Co. which later merged with the parent organization.

Mr. Hinman developed the export and government sales department and also handled certain selected accounts for the company.

VELSICOL CHEMICAL

W.H. Burns has been promoted to the position of eastern regional manager, resins and solvents division.

W. H. Burns

Mr. Burns brings to this position experience gained in nine years as a product development chemist and eastern sales representative for the firm.

He is a chemical engineering graduate of the Illinois Institute of Technology.

UNION CARBIDE

Daniel P. Shannon has been transferred to the new chemicals marketing group, which is located in the company's New York City office, it has been announced.

In his new position, Mr. Shannon will be responsible for promoting sales of certain groups of newly introduced alcohols, aldehydes, and acids. Prior to this post, Mr. Shannon was a technical representative in the Chicago district.

He joined the firm in 1954 and holds a B.S. degree in chemistry from Fordham University.

The transfer of four other technical representatives was also announced.

They are: **Lory A. Crisorio** to the Chicago district; **D. Wallace Enright** to the Charlotte district; **H. Robert Hubbs** to the Indianapolis district; and **Bernard W. Hurley** to the Chicago district.

CROWN CORK & SEAL

F. Stanley Kreps has been appointed manager of can sales for the New York region and **Patrick F. Flaherty** has been named manager of closure sales for the New York region, it has been announced.

P. F. Flaherty

F. S. Kreps

Mr. Kreps, who was formerly manager of national accounts, will be responsible for developing sales of all can products in his area.

Mr. Kreps has held various sales and administrative posts since joining the firm as a salesman in 1936. He is a graduate of Dickinson Law School.

Mr. Flaherty joined the company in 1931 as a sales representative. He will retain his present account responsibility and will also be responsible for developing new sales for the company's line of closure products.

Mr. Flaherty holds a degree in mechanical engineering from Polytechnic Institute of Brooklyn and an LLB from St. Lawrence University.

Jack P. Jordan has become consolidated district sales manager for the New York area, it has also been announced.

Mr. Jordan, a graduate of the University of Illinois, has been continuously affiliated with the firm for 18 years.

He most recently performed as New York assistant district sales manager and regional administrator. In his new capacity, Mr. Jordan will be responsible for the sale of the organization's entire line of cans, crowns, machinery, and closures.

NAFTONE

Allen G. Lilla has been appointed head of sales department, it has been announced.

For the past six years, Mr. Lilla had been associated with the Oronite Chemical Co.

He received his chemical education at Kansas University.

PICCO

Caesar A. Ricci recently joined the firm's New Orleans district office, it has been announced.

He will work out of the Dallas sales residency.

Mr. Ricci attended Elon College in North Carolina and also Loyola in New Orleans.

H.B. FULLER

Thomas C. Fetterman has joined the chemical division as manager of technical service in the coatings department, it has been announced.

T. C. Fetterman

During the past several years, Mr. Fetterman has worked entirely in technical sales and service of synthetic raw materials for paint formulation and compounding.

Mr. Fetterman will be headquartered at the firm's special products plant in St. Bernard, Cincinnati, Ohio.

He is a graduate in chemical engineering from Michigan State University.

CELANESE

Edward W. Ward has been appointed director of marketing for the newly formed marketing department of the plastics division, it has been announced.

Dr. W. Paul Moeller succeeds Mr. Ward as sales manager. In turn, **James W. Flynn** has been named market development manager, succeeding Dr. Moeller.

Mr. Ward has been sales manager of the plastics division for the past 17 years. He is a 1921 graduate of New York University with a B.S. degree in chemical engineering.

Dr. Moeller had been market development manager since 1955. He graduated from Polytechnic Institute of Brooklyn in 1938.

Mr. Flynn has been a member of the plastics division since 1943. During the last two years, he served as assistant sales manager of the division. He is a 1939 graduate of Canisius College with a B.S. Degree in chemistry.

COLUMBIAN CARBON

Victor E. Buehrle, Jr. has joined the firm's sales staff in its Akron, Ohio office, it has been announced.

V. E. Buehrle, Jr.

Mr. Buehrle is a 1950 graduate in chemistry from Kent State University. He had previously been affiliated with the B. F. Goodrich Co. and General Tire & Rubber Company.

William C. Morton has been appointed assistant sales manager of the organization's L. Martin Lamp Black Unit with headquarters in Philadelphia, it has also been announced.

Mr. Morton joined the unit in 1945. Previously, he served in a sales capacity with E. I. duPont de Nemours & Co.

ARCHER-DANIELS-MIDLAND

Charles R. Buerki has been appointed technical sales representative for the firm's chemical products division in the Cleveland, Ohio area, it has been announced.

Mr. Buerki, formerly a chemist in the development department, will replace **John K. Lilly.**

A graduate of the University of Wisconsin with a bachelor's degree in chemistry, Mr. Buerki joined the company in 1950 as a control chemist.

PITTSBURG COKE & CHEMICAL

Dennis J. Killian has been promoted to supervisor, semi works plant, it has been announced.

Mr. Killian joined the company in 1950 as a chemist in the research department. He later served as chemical engineer and assistant supervisor, plasticizer plant; assistant to the superintendent, industrial chemicals division; and most recently as chemical production staff assistant.

CALIFORNIA INK

Jack B. Dutton has joined the raw materials division, it has been announced.

J. B. Dutton

Mr. Dutton has been spending some time in the firm's Berkely laboratories and San Francisco headquarters, prior to joining the Los Angeles sales force.

Mr. Dutton had been previously associated with Bradley & Ekstron, Metals Disintigrating Co., and the American Cyanamid Co.

GENERAL MILLS

The following appointments for the chemical division have been announced: **David E. Terry** as technical service and sales development manager; **M.S. Herban** as technical service representative; **R.B. Kron** as assistant to the manager of sales; and **Thomas H. Boyd** as Philadelphia district sales manager.

Mr. Terry joined the firm in 1939 as a research chemical engineer after graduation from the University of Minnesota. In 1956, he became product manager for fatty nitrogen compounds.

Mr. Herban has been with the company for the past 13 years. Most recently, he served as Versamid polyamide resin product manager. He holds a chemistry degree from the University of Minnesota.

Prior to joining the firm in 1952, Mr. Kron was employed as a quality control chemist by the Toni Co. He has held a variety of posts and, most recently, he was technical service manager of the central research laboratories. Mr. Kron is also a graduate in chemistry of the University of Minnesota.

In his new position, Mr. Boyd will supervise sales of Versamid polyamide resins, Genamid co-reactants, fatty nitrogen derivative compounds, and sterols to eastern and South Atlantic seaboard marketing areas. He is a 1948 graduate of Bowdoin College.

ST. JOSEPH LEAD

James M. Jones has joined the firm as zinc oxide sales representative, it has been announced.

J. M. Jones

Mr. Jones' headquarters are at the company's New York office. His territorial assignment includes metropolitan New York, southern Connecticut, and eastern New York State.

Upon graduation from Penn State University in 1951, Mr. Jones joined the Goodyear Tire & Rubber Co. Since 1953, he has been a sales representative for Goodyear.

SPENCER KELLOGG & SONS

Earl B. Smith, Jr. has become manager of the newly created special products sales department in Buffalo, and **Hans M. Hauge** has been transferred from the chemical development section of the industrial products department to the technical service department.

Mr. Smith has been with the firm since 1948. Most recently, he was west coast technical service representative. He is a 1948 graduate of the University of Michigan with a B.S. degree in chemical engineering.

Mr. Hauge joined the organization in 1954 and was assigned to the research center where he served as a chemist. He graduated from North Dakota Agricultural College in 1951 with a B.S. Degree in chemical technology.

SHELL DEVELOPMENT

Dr. C.W. Smith has returned to the company's Emeryville, Calif. research center after a two-year assignment at the head office in New York, it has been announced.

In New York, Dr. Smith was technical assistant to the president. Dr. Smith is now assistant department head of the plastics and resins department.

R.W. Martin has replaced Dr. Smith in New York.

Dr. Smith joined the firm in 1943 after receiving his Ph.D. degree in organic chemistry from the University of Illinois.

Thomas F. Mika has returned to the Emeryville research center after an assignment in New York, it has also been announced.

In New York, Mr. Mika was attached to the chemical sales division. His present appointment is as assistant department head of the product development department.

Mr. Mika holds a B.S. degree in chemistry from Illinois Institute of technology.

A. De Benedictis has left the Emeryville research center to take a two-year assignment with the chemical sales division in New York.

Mr. De Benedictis is a graduate of the University of California with a B.S. degree in chemistry. He has been a research chemist with the firm since 1937.

AMERICAN CYANAMID

George H. Carleu has joined the sales office of the pigments division, it has been announced.

G. H. Carleu

He will be a sales representative in the Chicago area.

Mr. Carleu, a graduate of Princeton University, joined the organization in 1954 as a sales trainee at the Bound Brook plant.

Prior to this, Mr. Carleu was associated with the U.S. Rubber Company in Naugatuck, Conn.

incomplete at the moment, as we have not yet used in production all the various forms and types of equipment offered.

Airless Spray

Airless spray greatly reduces the amount of overspray and bounce-back. The equipment today is much improved over earlier processing. Certain problems exist in the high production encountered in the automobile business. The variety of colors requires either a quick means of switching from one color to another, or a great number of sprays guns, each connected to a given color. In a typical plant, we may have 30 sprayers, each with a choice of 20 colors available. Since the bodies are built to order, we seldom run more than two in the same color consecutively. So the problems of distributing paint at 600 p.s.i., in a variety of colors, to many locations is quite involved. We have had more success with airless spray in the undercoat or primer. The corrosion-preventing type of prime, with lower pigment to binder ratio than the sanding primer-surfacer, works very well with airless equipment, and we are using airless spray in many of our plants for this purpose. The highly pigmented materials in primer-surfacer tend to wear the orifice of the airless spray gun (due to the extreme pressure), spoiling the spray pattern, reducing the economy, and down-grading the surface of the sprayed work.

We would have no hesitancy in recommending airless equipment for spraying non-abrasive paints, such as primers and enamels, providing such application fell within the limitations described above. The saving potential in materials is very attractive. A second recommendation for this type of equipment is the reduction in the amount of make-up and exhaust air required. Airless spray produces practically no overspray or bounce-back. Any waste is in the form of fall-out, or that portion of the spray pattern not striking the work. Only enough make-up and exhaust to remove solvent vapors is needed.

Dipping

Dip or flow coating with primer materials presently available is not entirely practical for large structures such as auto bodies because of the problem of runs and sags. It would not be feasible to maintain dip tanks in many colors even if it were possible to topcoat the body by dipping. We are keeping an open mind on the use of dipping for anti-corrosion primers, and are running continual experiments with the various materials as they become available.

At the present time, then, we are still in the area of air spray, and the problem now becomes one of improving what we are doing. There are three approaches under study and in actual use, i.e., hot-spray, the hi-lo thinner principle, and mechanization of spraying operation.

Hot Spray

Hot spray techniques have been studied for years for the automotive industry. The potential savings are quite apparent, and the problem has been one of equipment. In the conventional hot spray system, it is either necessary to circulate the paint through a double hose system at each spray outlet, or heat the paint with an individual heater and heat the spray hose with a heated jacket of one kind or another. Either system requires a paint heater for each color at each outlet. Now in the furniture industry, or in any industry using only one or two colors, this is a small problem, but again we are faced with the multiplicity of colors in the automobile business. We have some plants producing more than one make of automobile where the sprayer may have as many as 55 colors from which to make his selection. Multiply these 55 colors by 30 sprayers and one can readily see how many individual heaters and pumps would be necessary. The maintenance potential would be almost prohibitive, not to mention the loss of production should any single unit fail.

Through a new approach to the circulating paint system, we have been able to eliminate the need for separate heaters and recirculating pumps, and are now able to heat the entire paint system with a minimum of equipment. Only two heaters are used in addition to the normal cold circulating system.

One of our plants began using hot-spray equipment in November 1957. The heaters are operating at 145° F. which gives a temperature at the spray guns of approximately 135° F.

A white lacquer was first used in the system. At this time it was noted that the required film build could be maintained easily using only two coats of paint instead of three as was customary at this plant. Because of less reduction and more expensive thinners used in the hot system it was found that change to two coats was actually a necessity in order to make the system pay, as the thinned paint for this system is considerably more expensive than that previously used. Evaluation of this system by means of comparable flow and equal film builds with the cold system indicated a substantial theoretical paint savings with the hot system, plus a savings in man power.

The hot system was cleaned out and changed to a white acrylic lacquer in February 1958. This was our first use of this relatively new paint material in a hot system. By adding a small amount of retarder the system proved quite satisfactory on spray out. This again raised the cost of the reduced paint and would make its cost prohibitive if three coats were necessary or if the materials were wasted in any way. The flow rates on the hot system compared to the cold again showed a savings.

In March 1958 a metallic blue acrylic was put into the system. This was to check the effect of heat on a metallic spray out. Even with this material the required film build was easily maintained and spray out was good. At this time the plant began experimenting with additional retarder in the system. Even at viscosities of 44 seconds in a No. 1 Zahn cup with mixtures of one-half thinner and one-half retarder for reduction, the material sprayed very well. However, no great improvement could be seen, the cost of the reduced material was raised considerably and so this trend has been revised to as little retarder in the system as possible to get flow out. However,

it did show that the system is versatile in handling different mixtures. Evaluation of this material with the proper reduction again showed a savings using the two coat system. The plant is presently operating with this color using two coats on the outside and experimenting with single coats on the inside of the trunk and the door jambs. This is possible since one coat gives sufficient coverage for color but not enough film build to meet outside requirements. This method will save considerably on paint material and should provide further savings.

Thinner Considerations

Some years ago lacquer thinner was composed largely of medium boiling solvents and diluents, all of a reasonably close boiling range. A fresh approach was indicated here, and a radical change was made by including a very fast fraction and some rather slow fractions along with the middle range components. The slow portions should be true solvents since they stay in the film the longest, and the use of long diluents would tend to produce precipitation or kick-out. The theory of any thinner is to reduce the viscosity of the paint to a proper spraying consistency, and to attain maximum leveling after spraying. The less thinner needed, the more solid paint applied per pass of the gun. So we need a compromise between low viscosities producting good atomization and high viscosities producing high film build. Now, if we replace a portion of our thinner with a fast evaporating solvent or diluent, we can get our required spraying viscosity the same as before. However, this fast fraction will evaporate after the atomization occurs, thus effectively raising the viscosity of the material between gun and work. This produces higher film builds per pass, since it allows more paint to be deposited without sagging. We also introduce a portion of long solvent to improve the leveling characteristics in the film and to reduce the tendency to produce solvent blistering, "boiling", or "popping".

Automatic Spraying

Any hand spray operation carries with it the possibility of uneven applications, with a danger of thin areas at the one extreme and excesssively heavy portions at the other. Thin spots in a paint job run the risk of blistering in excessive humidity, and rubbed through areas as the owner continues to wash and polish his car. Heavy films have a tendency toward thermal cracking and alligator cracking. Obviously the answer to this is mechanization of the spray operation so that a machine, when properly set, will deposit the same film thickness on every piece of work all day long.

We have been spraying automobile roofs for many years mechanically, using a reciprocating device which passes the spray gun transversely across the roof. Number of strokes per body, and speed of gun travel, are adjustable, to accommodate changes in line speed. We build our own equipment originally, but it is now available commercially from many sources.

Following the success of our automatic roof spray, one of our plants in effect turned the roof spray machine on its end, and begun spraying the sides of the body mechanically, the gun reciprocating vertically as the body passes the machine. Such machines are now in use in all our plants. The results have been much more uniform film thicknesses, with resultant improvement in the durability of our paint job.

FURNITURE

(*From page 41*)

Solvent No savings in the cost of the solvents per pound of lacquer solids applied were made by changing to hot lacquer. The lower solvent content of hot lacquer was more than offset by the increased cost of using higher priced solvents to slow down the drying of the lacquer and prevent bubbling.

Quality Improvements

Durability By using a lacquer made from higher viscosity nitrocellulose, the resistance to cold-checking has been measurably increased. Such a step would be possible with cold lacquer without applying additional coats.

Appearance The finish of the furniture sprayed with hot lacquer is smoother and shows better body than that on furniture finished by the old method with cold lacquer. We have already mentioned the fact that there are few repairs when hot lacquer is used. These advantages are the result of a thicker coat of lacquer.

Actual tests have shown that 17% more lacquer solids are applied to a table top using two coats of 26% hot lacquer than with three coats of 21% cold lacquer. The higher solids content of the lacquer would not alone account for this difference. The greater build of hot lacquer is the result of two additional factors:

1. Higher fluid pressure, producing a greater rate of flow for the lacquer.
2. Lapping each stroke with hot lacquer to a greater degree than with cold lacquer. This is possible because hot lacquer has much less tendency to sag.

The R-way Furniture Company also manufactures metal frames which are used in all case goods to prevent sticking drawers and eliminate the possibility of the case sagging, particularly in the case of double dressers. These metal frames are given a durable attractive rust resistant finish with hot lacquer. Since this is a highly pigmented flat lacquer, it was found necessary to use a different type of lacquer-heater which does not circulate the lacquer through a heating-unit with a pump, but warms it by forcing a steam of hot air along the fluid-line and also by spraying the lacquer with hot air. This type of lacquer heater is almost trouble free and enables us to obtain a satisfactory finish on the metal chassis with one coat instead of two.

New Trends

We would like to mention that we have two other trends in furniture finishing.

About a year ago an oil-type of finish was introduced at the Chicago Furniture show which gave a dry open-pore look to the furniture. We used this finish on a teakwood suite but we found that this was not a popular type of finish. In addition it scratched easily and was difficult to repair.

The other trend at the present time is towards the use of decorative wood-grain melamine laminates on exposed surface of furniture.

The R-way Furniture Company manufactures two type of dining room tables, one type is small for use in dinettes and about 80% of these tables are ordered with a decorative-formica top. The other type, a full size dining-room table for use in a dining-room is rarely, if ever, ordered with a plastic-laminate even though these are available at the same price.

The R-way Furniture Company also manufactures a line of contract furniture for hotels and institutions where all exposed surfaces are covered with plastic laminates. This furniture is designed for hard wear and to resist spotting from alcholic beverages, etc.

This same type of furniture was offered to our regular trade but has not sold well and only in cases where it is to be used in a boy's room or some other place where hard service is anticipated. In other words, the home owner still prefers genuine wood veneers on their furniture and not a printed imitation even though they know that the latter is more durable.

The R-way Furniture Co. is always interested in experimenting with new types of finishes and new methods of applications, and are looking forward to future developments which will enable us to give better value to our customers.

AIRCRAFT

(*From page 42*)

solvent balance; but on the other hand overspray is reduced to a minimum and any overapplication is easily detected in the form of sags and runs. The airless spray method of application has been adapted to all finishes now being used at The Martin Company and has many advantages such as:

1. Better thickness control.
2. Minimum overspray resulting in cleaner conditions, saving in materials, and less expense for ventilating facilities.
3. Virtual elimination of sanding often resulted in removal of paint at high spots and rivet heads.
4. As a hot application, reduces possibility of blushing and saves thinner.

Although much progress has been made in the last two or three years both in methods of application and in development of new types of finishes by the manufacturers, the present status of finishing systems for aircraft shows a huge lag behind design demands for adequate protection of exterior surfaces. With almost limitless power available both from jet engine improvements and rockets engines, operating velocities and attainable altitudes are on an ever increasing curve in both manned aircraft and missiles. This rapid advance in aircraft design makes either development of greatly improved finishing systems or new concepts in methods of protection mandatory. Requirements for near future finishing system include all of the present requirements plus increases in heat resistance, low temperature flexibility, temperature shock characteristics, adhesion, and erosion resistance. These must be attained in relatively thin film thickness due to the ever present weight factor in aircraft design. The challenge to the paint industry for extensive research to meet these demands is great. We hope the demands can be met at an early date.

NEW DEVELOPMENT

(*From page 36*)

from paint, there is still upwards of 50 million pounds of rosin used in paint directly and more than that indirectly as so-called synthetic resins. This is likely to continue until a rising generation of resin and varnish chemists is not required to learn paint formulation with rosin, and instead learn the many versatile uses of styrene.

Versatility of styrene may be overlooked by those who stand in awe at the amount of water-based paint made from butadiene-styrene latex. They should note that styrene has had a dozen years of success as a copolymer with oils and alkyds, giving finishes that rival lacquers for speed of drying in such end uses as automotive refinishing enamels, military shell lacquers and clear wood floor sealers. They, as well as lacquers, have some shortcomings in resistance to various solvents, but improvements are being made in these through copolymerization with other, more expensive monomers.

Styrene copolymerization is controlled rather easily in either Dowtherm or steam jacketed kettles, which are by now common throughout the paint industry. Chemists in small as well as large paint companies are elaborating the techniques of styrene polymerization and will firmly establish styrene as a vehicle in paint. These paint chemists are close to performance problems presented by paint buyers and are therefore a step nearer to a practical formulation than their chemist friends who work with producers of styrene and related monomers. This is illustrated in the current offerings by at least three paint companies of thermosetting solvent type appliance finishes, from their own synthesis and formulations, based on styrene and various comonomers. Just as earlier paint chemists upgraded rosin by lime, glycerine, tung oil, pentaerythritol, phenolic condensates, maleic anhydride, etc., so now do our contemporary paint chemists upgrade styrene with selections from drying oils, alkyds, acrylate esters, acrylonitrile, epoxy polymers, etc.

Polyesters

Styrene-type polyesters offer yet another bright hope for paint industry utilization of styrene. Overshadowed in the United States by paint type styrene-butadiene latex on the one hand and by glass-laminate type polyesters on the other, styrene has fallen behind in the field of furniture finishing. We have fallen behind West Germany and perhaps England in introducing styrene-type polyesters to the factory finishing of furniture. A sizeable percentage of all factory produced furniture in Germany is said to be finished by combinations of styrene with maleic-phthalic-glycol type polyesters. These combinations are cured by small percentages of peroxides, accelerators and paint driers, either at room temperature or at the so-called force-dry temperatures of about 140°F.

One coat, multimil films of surpassing toughness, beauty and durability are achieved at reasonable cost. Although elegant and expensive furniture and pleasure craft are logical early end uses for polyester finishes, one may foresee the extension of polyester finishes to other uses of wood, perhaps even to wood used in construction. Wood is the original reinforced plastic, endowed by nature with great strength, but subject to cracking, warping and shrinking and also to biological decay. Construction over the last fifteen years of military and civilian boats from polyesters and glass fibers over wooden frames has revealed the resistance to decay of the wood which is achieved by encapsulation of the wood in polyester. It was suggested that the polyester components kill fungi present in the surface layer of the wood and that the cured resin prevents entry of new fungi, even though it is slightly permeable to air and moisture vapor. Use of polyesters at 30 to 40 cents per pound for treatment of wood at the kiln does at first thought seem too expensive for wood intended for construction. But great amounts have been spent in research and on use of creosote, zinc salts, chlorinated phenols, and urea and phenolic resin condensates in treatment of wood, with limited success. Greatly extended life in uses ranging from cross ties to laminated beams, to concrete forms, to house siding offers a challenge to the wood industry. A paint chemist would welcome the double opportunity of selling the polyester resin and of having a more uniformly paintable surface.

Unfilled Needs

Discussion on any one facet of the paint industry is necessarily brief. Long chapters and whole books continue to be written on various aspects of it. Paint chemists have developed tens of thousands of formulations tailored precisely to inumerable end uses and modes of application. In these products they use thousands of purchased materials selected from classes of pigments, liquid binders, solvents, catalysts, inhibitors, additives, etc. A selected list of important, unfulfilled needs may include the following:

1. Fungicides which will remain effective throughout the useful life of a paint and without adverse effects such as package corrosion, odor, dark colors, toxicity to plants and animals, disturbance of pigment properties and general lowering of durability.
2. Bactericidal agents along the same lines.
3. Yellow pigments of good permanence, low toxicity, low chalking rate and in clean, light tones.
4. In other colors such as blues, greens and reds there have been notable advances, but solubility and recrystallization problems persist.
5. Corrosion inhibition in water system paints for metals is a promising field of endeavor.

These and the previously mentioned needs for improvements in thickeners for water systems and of better vehicles for fire retardant paint illustrate the problems continuing in the broad range of paint technology which offer a challenge to the chemical industry.

BRUSHABILITY

(*From page 48*)

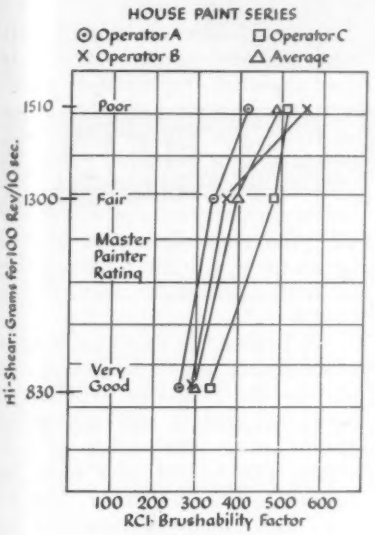

Figure 5.

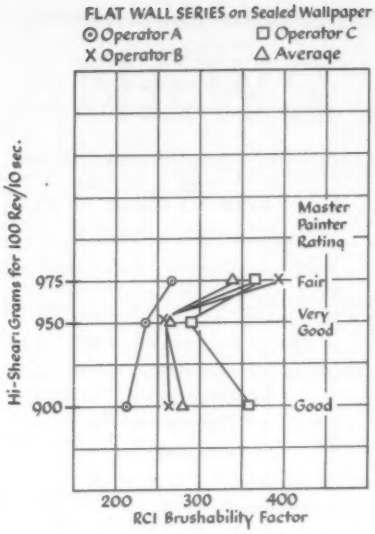

Figure 6.

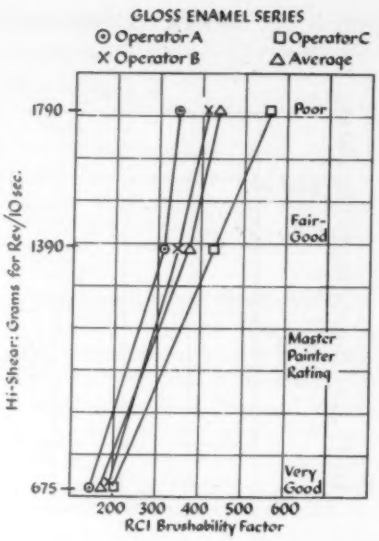

Figure 7.

Discussion

It was mentioned earlier that an attempt was made to overcome the "personality factor" of differences in paint application by attempting to duplicate the brushing technique but without success. Results reported are therefore with each operator using essentially his own brushing technique. What seems to be one of the greatest difference between operators was in the brushing speed. Operator A, who generally reported the lowest brushability factors, used a slower stroke (about 70 to 75 per minute) than either Operator B (about 80 to 85) or Operator C (about 95 to 100). Both Operators B and C had a tendency to intersperse some shorter strokes with the longer ones. Operator A seemed to dip the brush just a little bit deeper into the paint and therefore picked up more paint per brushful so that even though his strokes were slower his overall application time was generally no greater than for the others.

Examination of the data in Tables 1 and 2 show that there was no consistent difference between operators. Differences in final factor size could be contributed by any or a combination of the three measured quantities.

A master painter applied each paint several times—one time with a switch in coding. On paints which were very similar in brushing ease, as measured either by the high-shear instrument or the brushability recorder, it was difficult for him to rank them consistently, but there was no difficulty with paints which differed even moderately. Thus, "very good" and "good" paints were alternated in one case and the order in a group rated originally as "fair" was changed after repeated brushing.

As a general conclusion of the comparisons shown here, there appears to be a good correlation between the high-shear type of instrument and the RCI Brushability Recorder. Only in the flat wall group was there any departure from a general straight line relationship. In this case the recorder detected the difference between paints 5 and 6 in the same order as reported by the master painter. Undoubtedly, if the K.U. viscosity of paint #6 had been reduced slightly, it would have fallen in line also in that both the painter and the recorder would have observed softer brushing.

If we record the high-shear viscosity figures (grams/100 rev/10 sec) and the Brushability factors by areas for the various groups of paints as related to brushing ease, as reported by the Master Painter, we achieve results which fall in approximately the ranges given in Table 3.

High-Shear	Good to Very Good Brushing	Recorder Factor
800–1000	House Paints	250–350
900–950	Flat Wall	200–300
675–1000	Gloss Enamels	200–300
400–600	PVAc—Sealed Surface	200–300
400–600	PVAc–Unsealed Surface	400–600
	Fair to Good Brushing	
1200–1400	House Paints	300–450
About 950–1000	Flat Wall	300–400
1200–1400	Gloss Enamels	300–450
600–700	PVAc–Sealed Surface	350–550
600–700	PVAc–Unsealed Surface	650–750
	Poor Brushing	
1500 up	House Paints	450 up
1000 up	Flat Wall	400 up
1600 up	Gloss Enamels	400 up
850 up	PVAc–Sealed Surface	600 up
850 up	PVAc–Unsealed Surface	900 up

Table 3. Brushability reading.

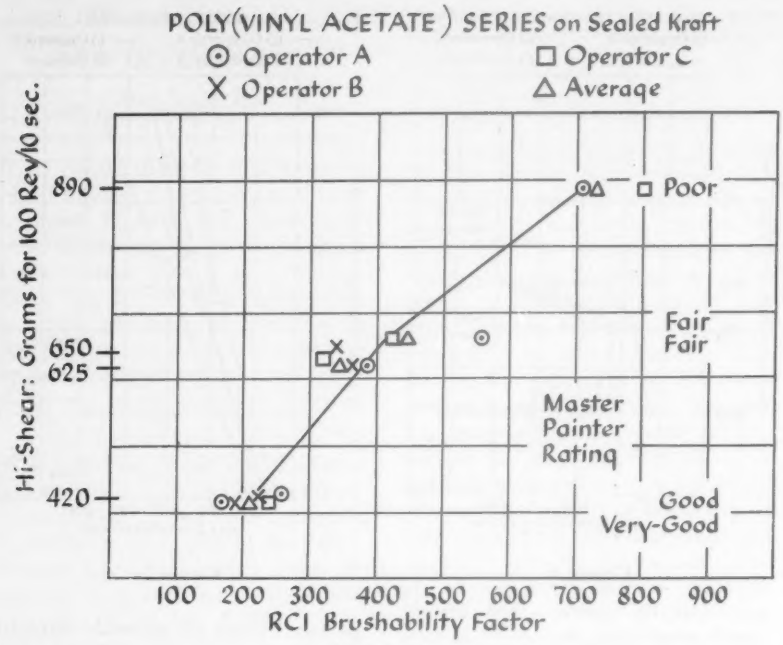

Figure 8.

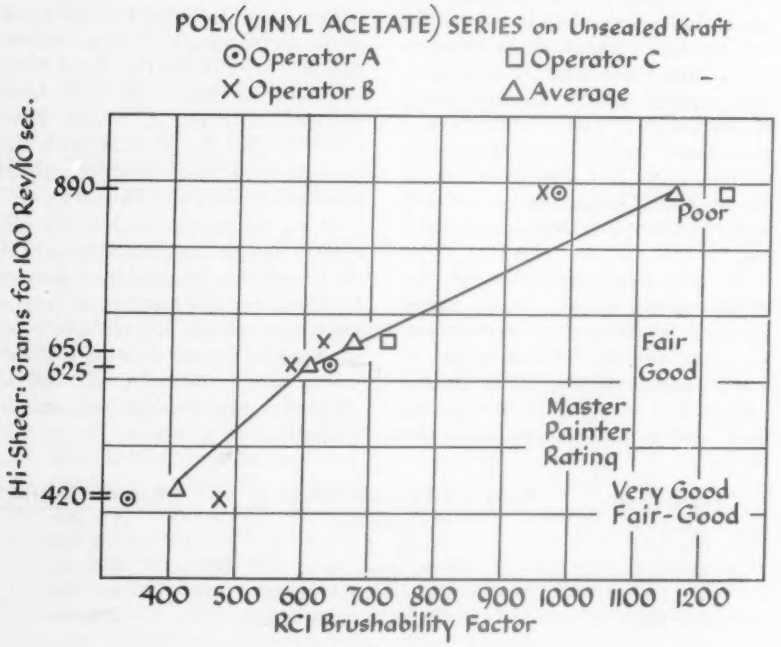

Figure 9.

It will be observed that except for the high values for PVAc's over unsealed surfaces, which are caused by the extra quantity of paint required to produce a good job, the brushability factors are fairly consistent for quality of brushing regardless of the type of paint applied, whereas with the high-shear instrument the range in viscosity values for a paint of given quality depends more on the type of paint. A study of the data from the New England Club Technical Committee shows that they encountered the same type of variation between classes of paint.

Comments and Conclusions

From our study of the high-shear type of viscosimeter we believe it is an excellent control instrument. Once a coating formulation has been established as having satisfactory brushing characteristics, this instrument is a reliable way of checking to see that succeeding batches perform in the same manner. Inexperienced help can make determinations after very little instruction.

The chief criticisms of the R.C.I. Brushability Recorder is that it is most useful in the hands of someone who can consistently repeat his techniques. In such hands repeat determinations on the same surfaces give consistent factors. Differences between operators vary with the particular paint and so far no good way for compensating for these "personality factors" has been found.

We believe the Recorder is more of a research and development tool and in the hands of experienced personnel gives a good picture of the relative brushability of different paints. It also aids the formulator to determine whether the "high" factor is caused by too much drag (deflection), too little capacity to hold in the brush (frequent dipping) or absorption into the painted surface (quantity of paint).

Acknowledgment

The authors wish to thank the others in our organization who assisted with preparing the data for this paper, especially Mr. Vern Becker who in the past has made most use of the recorder, and Mr. Kay Snyfeld, the master painter who gave his evaluations. Thanks algo go the RCI for permission to prepare and present it.

References

1. New England Club Technical Committee: Official Digest **28** No. 382, 1037-59 (1956).
2. Asbeck, Laidermann and Van Loo; J. Colloid Sci. **7**, No. 3, 1291-6 (1954).
3. Gardner-Sward Paints, Varnishes, Lacquers & Color.
4. Blackie Instrument Co., 9333 Edgewood Dr. La Mesa, Calif.
5. Birge "Quickie" was used in tests reported here.
6. Bakers, No. 2½" Long Island Sash-pure bristle.

Appendix

A brief description of the paint vehicles used:

House paint Series

1—Based on a 75% oil length orthophthalic alkyd commonly used for trim and trellis paints.
2—Based on an 85% oil length isophthalic vehicle which shows considerable promise in house paints.
3—Conventional ready-mixed linseed oil type house paint.

Flat Wall paint Series

4—TT-P-51b pure alkyd type.
5—Commercial painter's type pure alkyd flat wall.
6—Gelled type alkyd-amine vehicle.

Gloss Enamels

7—65% oil length alkyd vehicle.
#8—Puffed 60% oil length alkyd plus oleoresinous vehicle.
9—65% oil length alkyd and gelled alkyd-amine vheicle.

Poly(vinyl acetate) flat wall

#10—Large particle size adhesive type PVAc.
#11—1-2 micron particle size coating PVAc.
#12—0.2 to 0.3 micron homopolymer for coatings.
#13—0.2 to 0.3 micron copolymer for coatings.
#14—0.2 to 0.5 micron homopolymer developed for use in sealers.

The preceding paper was presented at the 133rd Meeting of the American Chemical Society, Division of Paint, Plastics and Printing Ink Chemistry, held April 13-18, 1958, in San Francisco, Calif.

Oct. 5-9. 36th Annual Meeting and 23rd Paint Industries' Show of Federation of Paint & Varnish Production Clubs, Cleveland Public Auditorium, Cleveland, Ohio.
Oct. 20-22. American Oil Chemists Society. Fall Meeting. Sherman Hotel, Chicago.
Oct. 27-29. Seventy-first annual convention of the National Paint, Varnish & Lacquer Assn., Shoreham Hotel, Washington, D. C.

PRODUCTION CLUB MEETINGS

Baltimore, 2nd Friday, Park Plaza Hotel.
Chicago, 1st Monday, Furniture Mart.
C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Hayes Hotel.
Cleveland, 3rd Friday, Harvey Restaurant.
Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.
Detroit, 4th Tuesday, Rackham Building.
Golden Gate, 3rd Monday, Sabella's Restaurant, San Francisco.
Houston, Monday prior 2nd Tuesday, Rams Club.
Kansas City, 2nd Thursday, Pickwick Hotel.
Los Angeles, 2nd Wednesday, Scully's Cafe.
Louisville, 3rd Wednesday, Seelbach Hotel.
Montreal, 1st Wednesday, Queen's Hotel.
New England, 3rd Thursday, University Club, Boston.
New York, 1st Thursday, Brass Rail, 100 Park Ave.
Northwestern, 1st Friday, St. Paul Town and Country Club.
Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.
Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.
Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.
Rocky Mountain, 2nd Monday, Republican Club, Denver, Colo.
St. Louis, 3rd Tuesday, Kings-Way Hotel.
Southern, Annual Meetings Only.
Toronto, 3rd Monday, Oak Room, Union Station.
Western New York, 1st Monday, 40-8 Club, Buffalo.

NEWS

Binks Adds Course To School Curriculum

Rounding out the course of instruction at its spray painting school to cover all aspects of industrial finishing, the Binks Manufacturing Company has added instruction in electrostatic spray finishing, Burke B. Roche, president of the company, has announced.

In the new electrostatic course, students will have an opportunity to actually set up and operate an electrostatic system using the most modern equipment available. They will learn power requirements for such a system, optimum air and material pressures, gun positions, and what products are best suited for electrostatic finishing. In addition, they will be taught general theory behind the technique.

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In addition to the new electrostatic course, students will receive instruction in operating and servicing spray guns, paint circulating systems, material handling pumps, oil and water extractors, flocking equipment, compressors, spray booths, and automatic equipment.

Held in a spacious, modern classroom, the five-day course combines actual practice with expert instruction. The latest in audio-visual teaching aids are used to make the sessions interesting and meaningful.

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Capitalization of three Reichhold chemical companies in Europe will be increased substantially, making possible major plant expansions for increased and more diversified production of basic chemicals and synthetic resins, it has been disclosed by Henry H. Reichhold.

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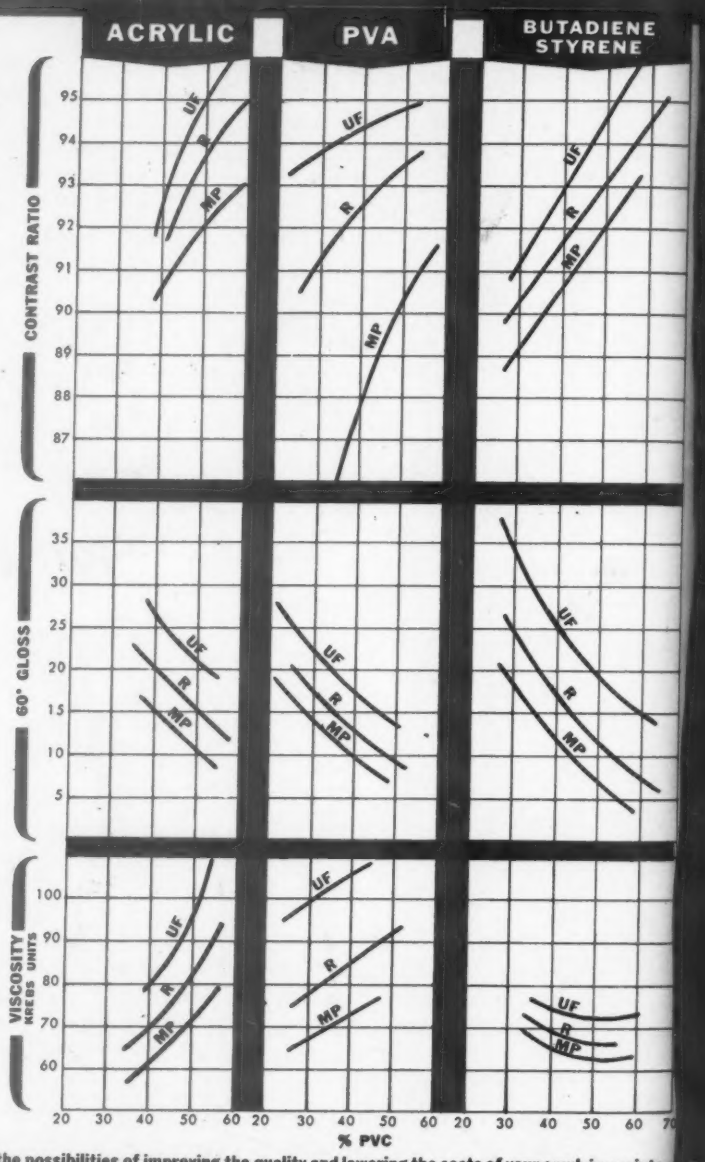

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